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HAZARDOUS AND TOXIC WASTE DISPOSAL FIELD HEARINGS

JOINT HEARINGS
BEFORE THE
SUBCOMMITTEES ON
ENVIRONMENTAL POLLUTION
AND
RESOURCE PROTECTION
OF THE
COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
NINETY-SIXTH CONGRESS
FIRST SESSION

MAY 18, 1979—NIAGARA FALLS, N.Y.
JUNE 29, 1979—SAN FRANCISCO, CALIF.

PART 2

SERIAL NO. 96-H9

Printed for the use of the Committee on
Environment and Public Works



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WASHINGTON : 1979

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CONTENTS

OPENING STATEMENTS

Chafee, Hon. John H., U.S. Senator from the State of Rhode Island	151
Moynihan, Hon. Daniel Patrick, U.S. Senator from the State of New York	1

LIST OF WITNESSES

NIAGARA FALLS, N.Y.

Caldwell, Robert Hamilton, University of Buffalo	57
Daly, Hon. John B., State Senator, State of New York	30
Davis, Bruce D., president, Industrial Chemicals Group, Hooker Chemical Co., accompanied by Thomas Truitt, counsel	12
Flacke, Robert F., commissioner, New York State Department of Environmental Conservation, accompanied by Dr. Glen Haughie, New York State Health Department	46
Prepared statement	83
Gibbs, Lois Marie, president, Love Canal Homeowners Association, accompanied by Dr. Beverly Paigen, cancer research scientist, Roswell Park Memorial Institute	33
Haughie, Dr. Glen	48
LaFalce, Hon. John J., a Representative in Congress from the State of New York	6
McCouf, Grace, resident of Love Canal	60
Prepared statement	128
O'Laughlin, Hon. Michael, mayor, Niagara Falls, N.Y	5
Paigen, Beverly	36
Prepared statement	62
Powers, Robert	60
Richardson, Chester, graduate of Massachusetts Institute of Technology	58
Sevinsky, James A., senior attorney, Environmental Protection Bureau, New York State Attorney General's Office	54

SAN FRANCISCO, CALIF. (p. 151)

Bard, Carla, member, California State Water Resource Control Board	158
Prepared statement	229
Supplemental statement	237
Collins, Harvey F., acting chief, Hazardous Materials Management Division, California Department of Public Health	166
Prepared statement	244
Cooper, Robert, professor of environmental health sciences, School of Public Health, University of California, Berkeley; Donald Whorton, professor of environmental health sciences, School of Public Health; and Robert Spear, professor of environmental health sciences, School of Public Health, University of California, Berkeley	212
Cowles, C. Deming, deputy commissioner, Alaska Department of Environmental Conservation	173
Prepared statement	274
DeNoville, Ron, general manager, Environmental Pollution Claims Division, Crawford & Co., Ventura, Calif	179
Prepared statement	288
Dubiel, Edwin, deputy attorney general, Department of Justice, State of California	180
Prepared statement	310

	Page
Witnesses—San Francisco, Calif.—Continued	
Gilman, Ivan, director, environmental affairs, Chevron U.S.A	192
Prepared statement	387
Gordon, Alvin, member, California Air Resources Board	171
Prepared statement	254
Krefting, Steve, Sierra Club, San Francisco, Calif	209
Martin, Michael, Department of Fish and Game, State of California.....	182
Siri, Jean, president, West Contra Costa Conservation League	197
Walgenbach, Fred, Department of Fish and Game, State of California	186
Prepared statement	356
Weiner, Peter H., special assistant, Governor's office	154
Prepared statement	218

ADDITIONAL MATERIAL

NIAGARA FALLS, N.Y.

Davis, Bruce D., president, Industrial Chemicals Group, Hooker Chemical Co., responses to written questions	23
Statements:	
Javits, Hon. Jacob K., U.S. Senator from the State of New York	2
Kemp, Hon. Jack, a Representative in Congress from the State of New York	4
Cerrillo, Deborah, vice president, Love Canal Home Owners Association ...	95
Clark, James L.....	99
Grenzy, Patricia.....	105
Hale, Joann M	115
Hillis, Anne	121
Kenny, Luella	125
Novak, Laurie	131
Pillittere, Joseph T., assemblyman, New York State Assembly	141
Pozniak, Marie	146

SAN FRANCISCO, CALIF.

California, State of, Department of Fish and Game, letter to Senator Chafee....	191
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HAZARDOUS AND TOXIC WASTE DISPOSAL

(Field Hearings)

FRIDAY, MAY 18, 1979

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEES ON ENVIRONMENTAL POLLUTION
AND RESOURCE PROTECTION,
Niagara Falls, N.Y.

The committee met at 1:45 p.m., pursuant to notice, in meeting room 3, Niagara Falls Convention Center, Niagara Falls, N.Y., Hon. Daniel Patrick Moynihan, presiding.

Present: Senator Moynihan.

Also present: Representative John J. LaFalce.

OPENING STATEMENT OF HON. DANIEL PATRICK MOYNIHAN, U.S. SENATOR FROM THE STATE OF NEW YORK

Senator MOYNIHAN. I would like to wish a very pleasant good afternoon to our guests, particularly to our witnesses. I now open this first field hearing of the Senate Committee on Environment and Public Works into the question of hazardous wastes in the environment, particularly the problem of abandoned and inactive hazardous waste disposal sites, which the U.S. Congress has now embarked upon. I have the honor to be accompanied by my distinguished colleague, the Congressman from this area, Mr. John LaFalce.

One of the matters we hope to hear testimony on is a bill which he and I have introduced to provide a national fund for the alleviation of this problem. The fund would provide for the reimbursement of persons who have incurred damages, for the restoration of toxic waste sites and for the development of a permanent national program to deal with what emerges as a much more serious problem than anyone has known and that was not known until the events that took place at the Love Canal. My colleague, John LaFalce played a distinguished role, if I may say, in aiding the succession of efforts by persons in the neighborhood to obtain a hearing from public authorities at the national level. They were not successful until they turned to their Congressman, and the rest is history.

In opening this session, I would like to make two points. One is that this is entirely a nonpartisan effort. It is a matter clearly beyond party, and I am happy to be able to place in the record at this time statements on the opening of these hearings by my revered senior colleague, Senator Javits, by my young friend and the colleague of Congressman LaFalce, Jack Kemp. I would also like to

submit a statement of my own into the record and of course Congressman LaFalce will testify in a short while.

[The statements referred to follow:]

OPENING STATEMENT OF HON. DANIEL PATRICK MOYNIHAN, U.S. SENATOR FROM THE STATE OF NEW YORK

We are here today to investigate a matter that is without a doubt one of the most serious environmental problems confronting us today. New York State, in particular, in the past year has been wracked by discovery after anguished discovery of a legacy of toxic contamination that has stirred fear and concern throughout the nation. There is no better place to begin to learn about this situation than here, for it was here that the initial discovery was made: the discovery of poisonous chemical wastes creeping into houses built next to an abandoned canal in Niagara County. It was here at the Love Canal that an incident caused by the dumping of hundreds of hazardous chemicals became the first pollution problem recognized to be a national calamity; an unfortunate harbinger of a problem that was at that point just beginning to be understood. It is here that hundreds of families have suffered immense dislocation from their daily lives, in having to move their homes, and in living with growing anxiety over the possible health effects that may be the result of this tragedy. It is here, finally, that we have involvement at all levels of government to address a problem that transgresses all artificial boundaries between local, state, and federal concern.

The residents of the Love Canal are the victims of a technological assault that exemplifies the problems associated with toxic waste disposal in a most dramatic and forceful way. As you are all aware, however, the Love Canal is only the first and perhaps the most well publicized of many similar disasters, in which the disposal of hazardous chemicals has caused the environmental and health tragedies with which we are now attempting to deal. The Environmental Protection Agency estimates that there may be 50,000 hazardous waste disposal sites nationwide, of which as many as 2,000 may have the lethal potential of a Love Canal. Indeed, in Niagara and Erie Counties alone, over 200 disposal sites have been catalogued. These sites have different characteristics; some are active, some are abandoned, some are government operated, some are privately owned. All, however, may be leaching toxic wastes and generating the chain of events that has brought us here today.

It is thus incumbent upon us to take prompt and responsible steps to address this most serious problem. This hearing is a demonstration of our intention to do so, not only here, but elsewhere, across the country, until we feel that we understand the scope of the problem that confronts us.

It will not be an easy task, and it is one that poses all manner of questions of public policy. Issues of equity, of the role of various levels of government, of the ultimate responsibility for cleanup of these wastes and restoration and some measure of normalcy to these disrupted lives all challenge our efforts. This is not a problem, however, of which anyone has been unaware. My distinguished colleagues, Senator Culver of Iowa and Senator Muskie of Maine, have already called numerous witnesses before their Subcommittees. Their concern and leadership is welcomed by us all. In addition, my colleague Congressman John LaFalce and I have introduced a bill that should begin to give us the means to handle this long neglected problem. The bill would establish a "superfund" to be financed by a fee on oil, gas, and hazardous waste disposal. The fund is to be administered by the Environmental Protection Agency, and would be used to provide immediate assistance in responding to emergency situations caused by releases of hazardous wastes; to compensate people injured by hazardous waste contamination; and to support state programs for the identification and treatment of abandoned hazardous waste sites. The bill also addresses issues of liability and site maintenance. We advance it as a mechanism whereby we can begin intelligent and focused discussion of a problem that concerns us all.

We are here today to continue this process. We thank those who have come before us to testify. We are here to help, and we await their report on what it is that we can do.

STATEMENT OF HON. JACOB K. JAVITS, U.S. SENATOR FROM THE STATE OF NEW YORK

Mr. Chairman, I appreciate the opportunity to present to the Committee on Environment and Public Works and the people of Niagara Falls to present my views on the Federal role in the disposal of hazardous waste.

It was just seven months ago that Senator Moynihan and I alerted our colleagues to an emergency situation in Niagara Falls, New York. A relatively obscure site known as Love Canal became the focus of national attention when it was discovered that chemicals, buried more than twenty-five years ago, had surfaced and infiltrated scores of nearby homes, posing serious health hazards to the residents and the environment. The events which followed are now history. Hundreds of families have been evacuated, but not without serious consequences—birth defects, miscarriages, skin irritants and respiratory ailments.

What also surfaced last summer was the realization that the Federal Government lacks the authority to deal with abandoned hazardous waste sites. The Congress, and this committee in particular, has been diligent in recognizing environmental hazards which threaten our ecosystem and pose problems for the health and welfare of the people. Accordingly, numerous laws have been enacted such as the National Environmental Policy Act, the Clean Air Act, the Federal Water Pollution Control Act, the Toxic Substances Control Act, and the Resource Conservation and Recovery Act. Although RCRA establishes a comprehensive program for the management of dangerous wastes, the issue of how to deal with abandoned sites has seemingly been forgotten. Love Canal is a tragic reminder that the issue can no longer be ignored.

The projected cost of clean-up, reconstruction and relocation of the Love Canal crisis is \$25 million. The only Federal response has been an emergency appropriation of \$4 million by the Congress, and \$2 million from the Federal Disaster Assistance Agency pursuant to a Presidential declaration of a state of emergency.

Here again, Federal law is lacking. Following the declaration of emergency, New York State submitted a series of project applications totaling \$23 million. Subsequently, FDAA cited Love Canal as, "a chronic health problem" and denied all but \$2 million for remedial construction of the southern portion of the Love Canal site. The FDAA Administrator informed New York, that, "the legislation under which FDAA operates is designed to deal with immediate emergency situations. If FDAA were to continue to provide emergency assistance over a period of years, we would be operating outside of the constraints intended for this program."

Unfortunately, the incident is not isolated, nor merely a problem for New York State. Since last summer, a number of additional sites have been identified including "Valley of the Drums" in Kentucky, Meadowlands in New Jersey, and leaking landfills in Iowa and Massachusetts. No one, including the Federal Government, the States, nor the industries which produced the chemicals, know how many landfills are leaking dangerous chemicals or where they are located. More importantly, no one is able to determine the number of people exposed, or what chemicals they are being exposed to.

According to the Environmental Protection Agency, there are approximately 32,000 landfills containing hazardous materials. Of these, EPA estimates that as many as 1,200 may be imminently hazardous to the public. Furthermore, EPA estimates that the costs associated with clean-up for the 1,200 sites range between \$3 million for temporary action, and \$26 to \$44 billion for a permanent solution. It appears that our industrial dreams of the 1940's could turn into a toxic nightmare for the 1970's.

Furthermore, Mr. Chairman, abandoned sites are not the only hazardous waste issues presenting problems to New York and the other States. As I mentioned, a portion of the needed regulatory framework dealing with active and future sites is already law. Subtitle "C" of the Resource Conservation and Recovery Act establishes a "cradle to grave" regulatory program which mandates Federal or State approved, monitoring of hazardous wastes beginning with the manufacturing process and ending with the disposal of wastes in a permitted site. It also provides for Federal funding for State hazardous waste programs.

The Act called for EPA to issue final guidelines by April 1978. However, the final regulations are not expected until early next year. Therefore, nearly 2 years after enactment, the majority of hazardous wastes continue to be disposed of improperly. The lack of Federal guidelines also hampers states which are attempting to establish their own disposal laws.

In the absence of Federal guidelines for both abandoned sites and current disposal sites, the burden has been left to the States. New York has been pursuing the problem through a number of aggressive initiatives: (1) Under the direction of Governor Carey, the Department of Environmental Conservation and the Health Department are preparing a comprehensive strategy of programs and funding for a Federal-State-local approach to the problems of hazardous wastes; (2) established an Erie/Niagara Task Force to identify industrial waste disposal sites in Erie and Niagara Counties. So far the task force has identified 200 sites in these two counties; (3) established a Statewide Study of Toxics in the Environment to identify statewide dump sites, contaminated groundwater and lake and river sediments. To

date the Statewide Study has identified nearly 500 locations which may have been used for the disposal of toxic or hazardous materials; and (4) enacted the Industrial Hazardous Waste Management Act to provide for the identification and listing of hazardous wastes, monitoring, storage and disposal.

Clearly, the states cannot afford to assume all of the costs associated with the management of hazardous wastes. The Federal government must share in the task.

First, I encourage and support the establishment of a comprehensive liability and compensation act, or, "superfund" which would make money available on an emergency basis for hazardous waste spills. In that way, those responsible for the wastes will help pay to clean them up. States could also consider a fee system as a means of financing their waste programs.

Second, Federal regulations for abandoned sites need to be established, and states with programs meeting those standards should be entitled to Federal aid. Without uniform guidelines states with strict guidelines run the risk of turning away industries which will seek to locate in states with less stringent laws.

Third, the level of Federal funding available for state clean-up programs needs to be increased.

Finally, we need to address the problem of public opposition to siting facilities. EPA estimates that when RCRA is implemented 50-60 additional sites for commercial use will be needed. Situations such as Love Canal have understandably made the public sensitive to the siting of hazardous waste facilities in their areas.

Mr. Chairman, I realize that the suggestions I have made are broad and raise a number of questions which need to be resolved. I urge the Congress and this committee to explore fully the alternatives and to develop responsible solutions to the problems.

I am encouraged by the recent actions of the Environmental Protection Agency which awarded a \$4 million grant to New York State to aid in the clean up of Love Canal, and its efforts to investigate the hazardous waste sites throughout the country. Furthermore, EPA has requested a supplemental appropriation for FY 1980 to enlarge its investigatory resources, a request which I will support in the Senate.

In summary, the disposal of hazardous wastes must be regulated. If new laws are needed, let's legislate. If existing laws need to be amended, let's amend them. And in the interim, the Federal government should be prepared to assist the states faced with emergencies such as Love Canal. For example, the emergency contingency fund contained in section 504 of the Federal Water Pollution Control Act Amendments was established to "provide assistance in emergencies caused by the release into the environment of any pollutant anticipated to present an imminent and substantial danger to the public health." This section has never been funded. The financial costs will be high, but we have already witnessed the human cost of not regulating.

STATEMENT OF HON. JACK KEMP, A REPRESENTATIVE IN CONGRESS FROM THE
STATE OF NEW YORK

Mr. Chairman, I am pleased to see that the government is responding to the real need at Love Canal and other neighborhoods around the United States, to get to the root of the toxic waste disposal problem and the health hazards it poses for unsuspecting citizens who may be affected.

Toxic wastes are among the deadliest of silent killers in this country. When handled properly, they can be disposed of safely and without harm to human life or to the ecosystem. What we have seen here is unfortunately only the tip of the iceberg of improperly disposed toxic wastes that threaten not only the health of our citizenry, but also the viability of industrial development which produces these wastes as a necessary byproduct.

As you all know, I am a firm supporter of industrial growth in our area and in this nation. The overwhelming majority of private businesses in this country are responsible enterprises, and they should not be penalized for the few's lack of public concern. But we are here today as the result of the failure of certain businesses to treat their wastes in a responsible manner, whether knowingly or unknowingly.

It is our duty, as representatives of the public, to ensure that present and future toxic industrial wastes do not in any way threaten the health or safety of the citizens of this nation, and I lend my full support to the members of this investigatory committee today in our mutual efforts to clean up the existing wastes at Love Canal, and to prevent further toxic contamination of our homes and neighborhoods.

Senator MOYNIHAN. I would like to record that Congressman Nowak of Buffalo is very active in support of the legislation that

Congressman LaFalce and I have introduced. He is a member of the House Public Works Committee which will handle this bill corresponding to our committee on the Senate side.

So we are all working together in this matter and have a very great deal of work to do. We are going to be holding hearings throughout the country. We wanted, as I said, to come here to open these hearings in the first instance. We have reason to think that there may be at least 50,000 hazardous waste sites to be dealt with in the Nation. There may be as many as 200 here in Niagara County. The cost of these actions is going to be very large. The costs in human suffering has already been substantial. It is estimated that there are probably 2,000 sites in the Nation with the poisonous and lethal potential of a Love Canal. This is the price we pay for having been a pioneer in the chemical industry from the late 19th century, when it became possible to generate a substantial amount of electricity from the Niagara Falls. This made possible the development of a chemical industry close to the source of this power before the development of alternating current enabled the transmission of electricity over long distances.

We are dealing here with the problems of technology and its impact on human society. This is hardly a new subject but it is one we mean to pursue with persistence and, I hope, with some success. We have been successful so far in merely identifying the extent of the problem.

It is my particular pleasure to have here to open our hearings the very distinguished mayor of Niagara Falls, who has been our constant support in all these matters. He is a credit to his calling. His mere endurance in these matters is a record.

Michael, would you come forward and say a word?

STATEMENT OF HON. MICHAEL O'LAUGHLIN, MAYOR, NIAGARA FALLS, N.Y.

Mr. O'LAUGHLIN. I am not here with a formal presentation. I have listened to a number and have given some and I have listened to a multitude of informal presentations. I am here just for a moment to say welcome to our Senator, Congressman, both very familiar with the area. We appreciate the fact that your thrust is such for the long range solving of this phenomenon. I call it a phenomenon now, but at the end of some period of time when the solution is reached, it will no longer be one. But at this time it is so new and unique to the problems and the seriousness involving the personnel in our city that it will take the concerted cooperation and brains for Federal people, State, local, and industry, and the brains of those that can be secured from any source to bring it all together. So I welcome you to our city and welcome especially the fact of the direction you are going in the solution of this problem. Hopefully the testimony that is given today will add impetus and firmness to what you are trying to do in the permanent solution to this problem.

I often think that we have allowed proliferation of wastes of old automobiles and old hot water tanks, and so on to be spread across our country and no one paid much attention to it. But when the burial of chemical problems came to our attention, it necessitated for the preservation of life and health that we take acute steps.

And the test is given to us as a country and the solution will be found originating here in our city.

Thank you very much.

Senator MOYNIHAN. May I say exactly it is that spirit in which you and your citizens in the city have brought about a transformation in the city of Niagara Falls. It is one of the most beautiful cities, with the most extraordinary facilities for visitors. The Winter Garden is almost as spectacular as the Niagara Falls itself and you are to be congratulated. We are all in your debt, and we thank you for your leadership.

Mr. O'LAUGHLIN. Thank you.

Senator MOYNIHAN. Now, I believe that Congressman LaFalce would like to take the witness stand and testify. This may seem to you a somewhat unusual proceeding, but it is common in Washington, when hearings begin on legislation which has been introduced in both bodies, for the Senator involved or the Congressman involved to appear at the committee of the other body and speak for the legislation in which he is a co-equal sponsor in a co-equal branch.

I need scarcely introduce John LaFalce to this company. We welcome you, sir.

**STATEMENT OF HON. JOHN J. LAFALCE, A REPRESENTATIVE
IN CONGRESS FROM THE STATE OF NEW YORK**

Representative LAFALCE. Thank you very much, Senator. First of all, I want to express my appreciation to you for bringing the Senate Committee on Environment and Public Works here to Niagara Falls for a field hearing. We are pleased at your presence. We are delighted at the presence of Senator Muskie's counsel, and I hope that once you hear from the people most knowledgeable about the problems of the Love Canal and once the staff of the full Senate committee hears from them, we will all be better able to do the jobs that we must do to come up with a legislative framework to better handle not only Love Canal but future Love Canal problems.

I am not going to go into the history of what has happened here in Niagara Falls. You and I have discussed this on many occasions, and we are both thoroughly conversant with it. What I would like to do, though, is underscore a few points. That is, I would like to underscore the fact that there are existing legislative mechanisms that, if adequately funded and if adequately interpreted, could have been used to assist Love Canal or could be used for future Love Canals. A caveat: even if they are adequately funded and adequately interpreted, however, they would prevent simply a patchwork attempt to deal with the problem. It would not present any overall comprehensive scheme to deal with the problem. For that new legislation is needed. So let me first speak of existing legislation on a Federal level and what we should do to improve that existing legislative framework and then address myself to the new legislation that is needed.

First, existing legislation. Your committee has responsibility for the Clean Water Act. And especially within that act there are a number of provisions of law that could be quite useful. First, I draw your attention to section 504 of the Clean Water Act. That

does contain the legislative authority for the Environmental Protection Agency to come in and offer immediate assistance, remedial assistance, to cope with the imminent hazards that exist in areas such as the Love Canal. When Congress passed that Clean Water Act, they authorized a certain amount of money—a minimal amount of money, to be sure, \$10 million. But Congress simply did not put its money where its mouth was. It didn't do it when it passed the Clean Water Act, and it has continually failed to do it. I am well aware of the eloquent arguments that you made, Senator Moynihan, that Senator Javits made, and that Senator Muskie made on behalf of full funding for section 504. I am also aware of the fact that OMB resisted this because, according to them, it would open a Pandora's box. The problem is the Pandora's box has already been opened, and the question is what are we going to do about it.

The minimal step that has to be taken is full funding of section 504, which is only \$10 million, hardly adequate to cope with the thousands or so abandoned hazardous waste sites that exist across this country, but at least a foot in the door pending the enactment of a more comprehensive legislative scheme to deal with this situation.

In addition to section 504, there is section 201 and section 208. I would like to talk about them a bit. Section 201 provides grants for construction of wastewater treatment works. It is roughly a \$40 billion program. The solution which was designed for the clean up of our canal is, in effect, a micro sewer system.

French tile drains were laid so the leachate could be collected. The contaminated waste is then being flushed through an onsite pretreatment plant and eventually through the municipal sewage treatment plant. If we could convince EPA to administratively recognize the fact that this plan of action is in essence part of a municipal sewer system, then 201 funds could be tapped in this innovative way or at least a small percentage of the 201 funds—and we are talking about a \$40 billion pot. If we could get them to commit using up to 5 percent of those funds for innovative purposes, we would have a resource under existing law. I remember quite well, Senator, that I was in Administrator Costle's office on Friday, August 5, 1978, trying to convince him of this, when you were on the Senate floor arguing on behalf of section 504.

Let me turn to section 208. Now, these are funds that the Federal Government gives to the State and then it is up to the State to use them for both State and areawide planning and management programs to address nonpoint source discharges. The 208 program provides for local input and localized planning. 208 agreements must be certified by the government, and no 201 grants can be awarded without the 208 agreement in place. I attempted to get the then Commissioner of the Department of Environmental Conservation in New York State to use some of the 208 moneys for planning at the canal. And as I met with resistance with OMB on 504, with EPA on 201, I met with resistance from DEC at that time on section 208, because they claimed it was unknown whether or not the toxic contaminants from the canal had yet polluted the ground-water or deep water aquifers.

It seemed to me the 208 planning program was suited to addressing the plan of whether (a) water contamination had occurred and if so, how to alleviate; or (b) if contamination had not taken place, how to make sure it didn't in the future.

So there again, I believe a creative use in interpretation of existing law could be of assistance in the future.

Section 311 of the Clean Water Act is another existing vehicle. It provides for the designation of hazardous substances which, when discharged, presents an imminent and substantial danger to the public health or welfare.

I remember going back to 1977—when very few people had even heard of the Love Canal and I was researching Federal law because I knew that we had a serious problem and I was trying to come up with provisions in existing law that could be of assistance. I reviewed section 311 and I found regulations for hazardous substances had not been promulgated pursuant to 311 even though it had been on the books for 5 years. I wrote to Doug Costle, the EPA Administrator, and to President Carter, and said we have to get these regulations promulgated. I pointed out I had a problem in my district no one had ever heard of but they would be hearing of it in the future and we better get these regulations in place. Finally after I prodded EPA for 6 months we got EPA to promulgate the regulations. Then we had another problem. Naturally, these regulations were applicable to corporate people, and one of them said, "Well, we don't like those regs and we are going to take you into court." They did this in Louisiana and the Louisiana State Court said, "You are right. These regulations are too ambiguous and vague." They were tossed out. Again we couldn't use 311 because of the lack of implementing regulations.

New regs have been promulgated and so now we do have a vehicle that can be used in certain circumstances. Once again, the problem is funding. There is a limited amount of money under section 311—I think there is now \$17 million left, and for the most part that can only be used when the pollution has actually escaped into navigable waters, and for very, very limited purposes.

What we will do with the expansion of section 311, through new law, is something that I will consider a little bit later.

Something else, there is another existing law that you, Senator, especially, more than anyone else, are very familiar with. And that is section 8001(a) of the RCRA, Resource Conservation and Recovery Act. After all else failed, we seized upon this section of the law which provides for a demonstration program to deal with situations such as this. As you know, our problem in 1978 was that although that section existed, it had never been funded and we were able to get \$4 million appropriated for use under section 8001(a). All of that money has been used for the Love Canal, and that is not nearly enough, not nearly enough. We must give more money for the demonstration program under section 8001(a).

Now, before we talk at great length about the new legislative framework, we ought to talk about the state of our knowledge right now, about human exposure to toxic substances and the harmful effects that come about from it. We are just beginning to learn about the causal relationship between human, exposure to such substances and human illness. We must study the problem at much

greater length and depth. I proposed before the House Commerce Committee an amendment to TSCA, Toxic Substances Control Act, an amendment which would provide up to \$2 million for an exhaustive study to be conducted by the Federal Government, be coordinated by the Council on Environmental Quality, to study that very question—the nature of the relationship between human illness and toxic substances once there had been exposure thereto. I am very pleased to say my amendment was passed by the subcommittee and passed by the full committee. I expect it to be coming to the floor of the House of Representatives shortly, and I would hope that my counterparts in the Senate would also see fit to keep that in the reauthorization legislation for TSCA.

It is very, very important, because our state of the art, our state of the knowledge, is rather low at this point, no matter where you go. We probably have as much expertise in New York State as any place in our Department of Health, headed by Dr. Axelrod. There is not that much expertise even within the National Institute of Environmental Health Sciences or National Institute for Occupational Safety and Health. They would be the first to tell you that we must research more. They would be the first to tell you that the Federal Government has got to devote themselves to a study of this nature.

Now, we have talked about the existing laws. We have to talk about new laws, because new laws are needed.

In 1976 Congress passed the Resource Conservation and Recovery Act. They attempted, through that act, to deal with the problem of hazardous wastes from cradle to grave. There are a lot of difficulties with that law. One of the difficulties is that EPA is years late in promulgating regulations pursuant to that law, and we have been working with them and pushing them and prodding them. The problem is we have to be careful about the regulations, otherwise we will have another 311 situation, where, if the regulations are promulgated without sufficient thought, they would be tossed out of the courts, as section 311 was, even after 5 years.

But above and beyond good regs to implement the existing RCRA law, we need amendments to RCRA, because RCRA does now deal with the problem of abandoned hazardous waste sites. It doesn't deal with Love Canal situations.

We must come up with legislation that will permit the Federal Government to identify the abandoned waste sites in concert with the States, to identify them to determine which ones do present imminent hazards, and to go about the task of the reclamation of those sites where feasible to do so. We can't clean up the world, but where there is a particular hazardous site where humans are being exposed to that site, those are the sites we must clean up and clean up immediately. And right now we don't have a legislative framework in a comprehensive sense to deal with that situation.

Something else we have to be concerned with—a lot of people are just concerned about that problem, cleaning up the waste sites. But I am concerned about another problem, because I have been exposed to the human dimension of the problem. We must be concerned with the human victims of such exposure. And nobody knows more about it than some of the individuals who are going to

be testifying here this afternoon, for example, such as Mrs. Lois Gibbs and others.

What do we do about their terrible, terrible problems? We have great difficulties with the law right now, because very often you don't find out about the fact that you are injured until maybe 25 years after someone has committed an act—maybe a negligent act, maybe not a negligent act. And how do you go about proving the causal relationship between that act and your injury? And under the law you must prove causality. How do you overcome the hurdle of the statute of limitations, which says that you have 2 or 3 years, or 4 years, depending upon the legal theory, from the act that caused the injury to bring your lawsuit, when you find out about it 25 or 35 years later? And should you put a person through the torture of the traditional legal process when you are dealing with a totally untraditional difficulty? Clearly not.

I think, Senator, that the legislation that we have introduced, the Toxic Waste and Tort Act, imperfect though you and I know it is, refined as it must be, does provide the first legislative vehicle to provide the comprehensive legislative framework to both deal with the problem of abandoned hazardous waste sites, improve our handling of permitted waste sites, those where dumping now is taking place, and also deal with the sticky, difficult problems of compensating the human victims of exposure to that site.

Now, after much refinement of our legislation, we have decided to provide via the so-called super fund approach, which would deal with oil spills and chemical spills and releases into the environment of dangerous particulates from the hazardous wastes.

The EPA has been working for a long time on this concept, and they have been having a difficult time convincing the administration to back a super fund approach. They have been opposed all along the way by the Department of Transportation, which wants solely an oil spill fund. They don't want to mix what they say are apples and oranges. Well, they are all hazardous wastes, and I am pleased to say that OMB and the Carter administration has come down on the side of EPA and has now decided to vigorously pursue the enactment of a super fund approach such as you and I have been pushing all along.

And I should point out, the leader in this effort is not you or I but Senator Muskie; for last year Senator Muskie was the chief advocate and was even able to get legislation through the Senate adopting the super fund approach.

However, there are problems with the EPA super fund concept. The draft legislation that they have come up with, which has not yet been introduced, just doesn't deal with some very difficult issues. First of all, it would have no retroactive effect, and so it wouldn't deal with the Love Canal problem. That, as far as I am concerned, is a sine qua non, a nonnegotiable item.

Second, it would deal with the problem of spills but not of releases into the environment, and that is unacceptable.

Third, it simply doesn't come to grips with the personal problems involved. It would provide no method of compensation for the innocent victims of exposure to toxic substances.

So while I enthusiastically endorse the concept of a super fund, and while I am extremely pleased that EPA was able to convince

the administration to back the superfund concept, we must be especially careful that the final legislation that is passed will do some good, will be something more than a law in name only, that it will have teeth in it, that it will be able to help with the real problems that we are so well aware of here in Niagara Falls. And the more the Senate will focus on our legislation rather than the administration's legislation, the better our chances, I think, for solving the real problems that come about through the Love Canal and future Love Canals.

I have taken a lot more time than my 10 minutes.

Senator MOYNIHAN. Not a minute more than you ought to have done. May I make two comments before you join us back up here in this hearing. The first is to say if there are people in the audience who are trying to understand the difference between the proposal which the Environmental Protection Agency has come forward with and that which Congressman LaFalce has done with respect to this fund, the EPA provides an amount of money for the protection of fish and wildlife, and we have made the radical proposal to include people.

And the second thing is simply to make a point that we have here a problem of the impact of technology on society. Long ago we learned that we have to deal with this through the insurance notion. The old common law notion of fault and who is to blame and so forth doesn't work. It was right here in New York State in 1906 that we began workmen's compensation in which a workman, injured through chemical insults to the body or mechanical insults, did not have to prove the company was to blame. The company was not in the situation of saying, "No, he is partly to blame." The compensation was on what is the injury.

Ours is the same thing. Persons injured through toxic substances, we assess the injury and try to compensate. It is a simple principle of insurance. It has worked.

The interesting thing is if the person is at Hooker Chemical, if a man working in that plant were injured, there had been workmen's compensation for him. But his wife and children at home, who may have been injured in the same industrial process, would have no such protection.

Representative LAFALCE. That is another very important feature of our bill, Senator, that I did not underscore—the fact that an injured victim, from exposure to toxic substances, would be able to go before the environmental victims compensation board that we would create under our legislation and obtain reimbursement for their injuries on a no fault basis, and then the government would be subrogated to the rights of that injured victim to go against the polluter. But here you would not have an individual who is making \$10,000 or \$15,000 per year who can't afford to go into court. Here you would have the Government subrogated to the rights of the injured victim who they had originally compensated and then go against the polluter both for reimbursement and, if the circumstances warrant, for punitive damages.

Senator MOYNIHAN. Exactly. We have no devil theories here. We are trying to be open and rational. When we talk about chemistry and chemicals, remember we would be so much worse off without them than we are. But there are certain facts of life, and that is

that the notion of equal justice before the law doesn't work when the case is between a housewife injured by industrial chemicals and the Dow Chemical Co.

Fifteen years and \$150,000 worth of legal fees later is no way to bring justice to people. That is what we are trying to do.

I have been remiss—and characteristically Congressman LaFalce noted—in not introducing for the record Mr. Karl Braithwaite, who is the distinguished counsel to the subcommittee of the Committee on Environment and Public Works which deals with these matters, and Dr. Sam Ratick, a member of my staff. They are here to keep a degree of accuracy in these hearings.

One other point I would like to make while John LaFalce is here beside me. That is, his comment about the availability of section 201 funds, a \$40 billion proposition—that the administration was not able to find the small sums of money needed for the Love Canal. It is a question we are going to have to put to President Carter when he comes back here next year.

Representative LaFalce. We have put it to him before, we will put it to him again.

Senator Moynihan. I think we will have his attention this year, when we didn't last year. That was a battle.

We have \$4 million now. It is available. And that is a beginning.

Let's go on with the hearing. We have as our first witness Mr. Bruce Davis, who is the president of the industrial group of the Hooker Chemical Co.

Mr. Davis, we welcome you. And if you have some associates you would like to bring forward, we welcome them as well and appreciate if you would introduce them.

STATEMENT OF BRUCE D. DAVIS, PRESIDENT, INDUSTRIAL CHEMICALS GROUP, HOOKER CHEMICAL CO., ACCOMPANIED BY THOMAS TRUITT, COUNSEL

Mr. DAVIS. This is Thomas Truitt, counsel for the company.

Senator Moynihan. May I say before we begin, I am going to have to ask that the witnesses confine their statements to 15 minutes of presentation each so that we will have some time for questions. There is always a problem at hearings that some persons are first and some are last. If the hearings go on too long, the people at the end have no audience and sometimes even have difficulty getting the attention of the persons conducting the hearing. And if people would like to simply introduce their statement for the record, if they have a written statement and summarize it. Use your time exactly as you will. We welcome you, sir.

Mr. DAVIS. Thank you very much, Senator. I would like to read my remarks, and I am sure I can stay within the 15 minute time frame.

I am Bruce Davis, president of the Industrial Chemicals Group of Hooker Chemical Co.

Hooker is deeply and vitally concerned with the problem of the disposal of wastes—what we as individuals and as a society no longer want, no longer need or no longer use—not just locally, but nationally, for this is indeed a problem national in its scope. I understand that various Federal legislative proposals have been

brought forward, and I am pleased to see the beginning of discussion for possible national solutions to this problem.

Accordingly, rather than discuss any particular Hooker disposal sites, I will address my remarks to the overall situation and potential legislative and technological solutions.

As a society, we have shared in the economic gains, improved health, increased mobility, convenience and comfort brought by modern technology. We enjoy our cars, comfortable housing, bountiful food supplies, improved sanitation and modern medical care. These improvements in the quality of life are due substantially to modern developments in the use of chemicals through science and technology. Recently, the problems associated with chemical residue disposal created in the manufacture of these desirable chemical products have attracted public attention to the chemical industry, and frankly, to the Hooker Chemical Co., in particular.

Without seeking to minimize Hooker's problems, I urge you not to let the focus of recent public attention, or the focus of my remarks today on the chemical industry, lead you to believe that the problem of hazardous wastes is limited to industry alone. Hazardous waste may be an important problem of ordinary municipal refuse as well. Normal household activities, especially the discard of used products, may generate hazardous wastes. Municipal waste disposal sites, as well as industrial waste disposal sites must, therefore, be taken into account when considering the improvement of past disposal practices.

With that broader perspective in mind, I would like to point out one other matter which is of great concern to us.

Discussions of waste disposal landfills all too often tend to lump all landfills together. In fact, there are at least five types of landfills, and each one, because of different circumstances, should be subject to different criteria when developing legislation.

Five typical landfill categories are:

1. Active and future sites which are RCRA-approved. These sites fall into two subcategories: those sites which are operated and controlled by a commercial waste disposal firm, and those sites which are operated and controlled by an individual company for its own wastes.

2. Closed sites, which are still owned by the original disposer. This category would encompass the Hyde Park, 102d Street, and S-area landfills, which Hooker still owns, and for which we assume responsibility.

3. Closed sites, which are not owned by the original disposer. The Love Canal would fit into this category.

4. Closed sites, which were used by many disposers, but owned by one disposer.

5. Abandoned sites, where no financially responsible owner or operator is to be found. The Valley of the Drums would fit into this category.

Once these differences have been recognized, a study of the applicability and appropriateness of legislation will be more productive. Simple solutions, such as that the landowner or waste depositor should be responsible for remedial costs, will produce some very complex and undesirable results.

The determination of responsibility must be influenced by a variety of social and historical considerations. Disposal standards have changed. Our analytical capabilities have also changed. We can now measure chemical substances at parts per billion and trillion; 10 years ago, the best we could do is parts per million. Many people at great distances from the disposal site have often benefited, directly or indirectly, from the products requiring this disposal.

Before any new laws are enacted, individual companies face the task of developing analytical, remedial and monitoring programs for those landfill sites they own, but which are not covered by RCRA. The remedial measures which Hooker is or will be designing and executing for its various landfills will serve as precedent for at least some of the hazardous waste problems that may be encountered elsewhere. Each site, of course, will be somewhat different.

Hooker has designed and is implementing a far-reaching, comprehensive and complex program for testing and monitoring the various landfill sites at Niagara Falls upon which sound plans for any required action can be based. We have already drilled over 100 test wells and plan to drill many more. The program also includes surveying, contour mapping and extensive soil and water sampling and analysis for possible pollutants.

On the basis of such data, we will be able to determine ground-water movements. These programs are so extensive, and the chemical testing required is so specialized, that qualified laboratories have been employed in Texas, Nebraska, Iowa, and California, to supplement our own capabilities and those in the nearby areas. Deadlines, milestone dates and program content have been developed in detail for each landfill site—and in conjunction I might also point out with this, State DEC—then carefully integrated into overall programs with review and approval by State and local agencies. We are on schedule and have met all milestone dates.

With the information derived from the testing and monitoring programs, we are able, in cooperation with governmental agencies, to design appropriate remedial programs. Much remedial work has already been completed, particularly at Hyde Park where leachate reduction and collection systems have been improved. Further remedial programs for Hyde Park, Bloody Run, 102d Street and the Niagara plant, including the S-area, will be designed as needed and will be implemented when completed.

With the benefit of our experience and development of new technology, we have been redesigning our chemical processes to improve efficiency and produce less waste. In addition, Hooker has initiated extensive process improvements to convert waste byproducts into useful materials. These methods, which eliminate waste at the inception, are generally the most desirable solutions to our present and future disposal problems, but it must be kept in mind that those kinds of solutions are not always technically feasible.

In that regard, it may be useful to your committee to have some technical background on hazardous wastes and their disposal. Perhaps the central fact is that there is no single effective disposal method, and each available method is technically complex. For example, there are three separate technologies involved in the incineration of wastes. The technology required to incinerate liquid

wastes is quite different from the technology required to incinerate solid industrial wastes, and both these technologies in turn are very different from the technology required to incinerate municipal refuse. And regardless of what form of waste is being disposed, it is not possible nor safe to incinerate all waste. There will be some wastes for which secure burial will still be required.

Hooker has developed a disposal method for liquid toxic wastes that is not only technically feasible, but is also economically and environmentally sound. It is the use of high temperature destruction for liquid chemical wastes.

We have been in the forefront of this research since the late fifties. There were many problems associated with the development of this process, because chemical wastes are just not like other wastes.

To illustrate this point, consider for example the presence of carbon tetrachloride, which is often found in chemical wastes. Perhaps you know this chemical as one that was used for many years in fire extinguishers * * * how does one burn a nonflammable material?

After years of persistent efforts, Hooker researchers found a way, which not only incinerates liquid chemical wastes, but does so without using an external fuel source, except during startup. This step was accomplished long before the energy crisis of the 1970's.

We constructed our own commercial incineration unit and started it up in October 1961. It was so successful that later we built another. Over the years, we modified the original design to handle even more kinds of liquid organic chemical residues, and from 1961 to 1978 we incinerated some 200,000 tons of liquid chemical wastes that otherwise might have gone to landfill. In addition, this reactor can process 2.5 million gallons of aqueous wastes per year. Today, essentially all of Hooker's organic liquid residues are burned.

As significant as Hooker's incineration program is, it is not a panacea for all waste. It does not solve the problem of disposing of thick sludges nor solid materials. While the technology exists for the incineration of these thick sludges and solid materials, commercial experience in this area is quite limited. Dow has conducted solid waste incineration using rotary kiln technology for some time. I understand that Kodak, in Rochester, N.Y., also has had a new rotary kiln unit operating over the last few years. There are still operating problems with this technology. Downtime is likely to be excessive because of problems such as refractory failure, feed mechanism upsets, handling of extremely hot ash, and the need for a nearby landfill. Cost estimates for these types of facilities are reported to be between \$10 and \$100 million, depending on size and complexity and are clearly not an inexpensive proposition.

Besides rotary kilns, there are other technologies for solid industrial waste incineration, including fluid bed and grate type incineration. In the future, others may be developed. We believe it is essential that Government policy and regulations encourage innovations in this field. Government mandates directing how incineration shall be performed discourage innovation. Government should mandate results not methods. As an example, EPA regulations currently mandate how PCB's must be incinerated. As a result, the incineration of PCB's is permitted at only one place in

the country, although there are other facilities, including our own, that could destroy PCB's safely and effectively.

Incineration of solid industrial waste is desirable, but there are problems which must be considered. Compared to the incineration of other forms of waste, which generally require little if any fuel, solid industrial waste incineration generally consumes a significant amount of energy.

Even if this technology is developed to its optimum, there is no possibility that secure landfill disposal can be entirely avoided. The reason for this statement is that some materials should not be burned at all. Further, ash from any incineration process is very likely to contain sufficient amounts of toxic materials to require secure landfilling.

More research is needed in this area and in other nonburial techniques. These are alternatives that Hooker Chemical is looking at for the future. We also, I might point out, are pursuing an entirely different area, which is incineration of municipal waste. We are constructing a \$74 million facility to burn municipal wastes, which will take about 50 percent of the municipal waste in this area, about 24 tons per day, and convert it to steam and energy, 600,000 pounds of steam per hour and 25 megawatts of power, and save 18 million gallons of oil per year.

Right now, Hooker is also pursuing a technologically different type of incineration process than that required for liquid or solid chemical wastes—it is incineration of municipal garbage, or as we call it, energy from waste (EFW).

Though again this will not solve the industrial waste problem, it will reduce landfill needs for Erie and Niagara Counties. When it is completed, next year, this \$70 million project will take 2,400 tons each day of formerly useless and potentially hazardous municipal refuse and convert it to 600,000 pounds per hour of steam and 25 megawatts of electrical power. This will free the equivalent of 18 million gallons of oil per year or enough fuel to heat 45,000 homes annually.

Finally, I will share with you some thoughts and concerns about legislation dealing with the disposal of hazardous wastes. In developing legislative approaches to deal with the problems emanating from past disposal practices, we believe it essential to keep in mind that in both origin and scope, these problems run far more broadly than Hooker, or the chemical industry, or even industry as a whole. They run far more broadly than the Niagara Frontier and New York State.

The recommended approach in the bills introduced in Congress thus far is a super fund or ultrafund. We believe this is a viable financial solution. However, it does need considerable refinement. The legislation proposed includes hazardous chemical spills, oil spills and all pre-RCRA disposal sites. Based upon this proposed ultrafund coverage, four major issues should be addressed and resolved before enacting legislation that deals with such complex issues as providing emergency funds for cleanup costs of abandoned sites and compensating injured persons.

The first issue to be resolved is the exact use of the ultrafund. In the five or six bills already introduced into the House and the

Senate, as many as seven alternatives for the use of the fund are included.

It might be useful to list those alternatives to see the extent to which the fund is being looked upon as a solution to these problems. Some of the proposed uses of the fund are: (1) To totally reclaim abandoned sites, including removal of wastes, where necessary; (2) to provide emergency assistance for any pollution to the environment from a waste-handling facility; (3) to pay for State waste disposal programs; (4) to compensate injured persons; (5) to pay for immediate cleanup from oil spills, chemical spills, and from abandoned disposal sites; (6) to compensate victims of spills and hazardous wastes for property damage of economic livelihood; and (7) to pay for any necessary programs where the responsible owner cannot be found.

As you can see, unless the use of the fund is carefully limited, it could very easily become the catchall for a multitude of environmental problems.

We believe the fund should be used for emergency and imminent hazard type situations and not as a monetary source for total reclamation of the land.

Further, a maximum limit on payouts from the fund should also be established to prevent abuses of the fund.

The second major issue to be addressed is whether or not the ultrafund should be comprehensive in its coverage. As I mentioned, the original concept of a hazardous waste ultrafund has now expanded in some proposals to include hazardous chemical spills and oil spills.

Problems associated with oil spills are quite different than problems associated with hazardous chemical spills; likewise, problems resulting from improper land disposal practices are quite different than those resulting from spills of hazardous substances. Because of the difference in the nature of their cleanup requirements, and also based on the fact that section 311 of the Clean Water Act sufficiently covers hazardous chemical spills, a new law is not needed for hazardous chemical spills.

The third issue to be addressed is the existence of different types of disposal sites, which of those sites should be covered and what should be the approach in their coverage.

The primary difference is between those sites used before RCRA was enacted and those sites currently regulated by RCRA. For the first time, in 1976, a law was created to oversee waste disposal practices. Prior to that, disposal was according to the state of the art. As I mentioned earlier, there are at least five waste disposal site categories and any new law should take into account the differing criteria for each type of site.

Last in this discussion is, of course, the fund itself. Because the problem is truly a national one, we feel that a fund should be comprised of public as well as industry funding. In fact, in view of the national scope of the problem, substantial Federal funding appears to be appropriate.

The approaches to the fund, itself, vary greatly from charging a fee to the disposer, to charging a fee to producers of petrochemicals and natural gas.

We feel that any fee charged should be low enough to encourage additional research and development of recycling and waste reduction methods. If a fee is charged on the disposal of hazardous wastes, we feel that hazardous wastes should be those as defined in the Resource Conservation and Recovery Act so as to minimize additional administrative burdens and to properly identify truly hazardous materials.

The complexity and far reaching societal and health implications associated with this nationwide problem—past, present, and future—are certainly of considerable interest and concern to the Hooker Chemical Co., and the entire chemical industry. We are working closely with the Chemical Manufacturers Association to develop industrywide recommendations. We are also looking forward to continued cooperation between industry and Government, for the benefit of all, so that society today and future generations can continue to enjoy the improved quality of life that has come, in great part, from advancements made through chemistry.

Mr. Chairman, I hope that this discussion along with our perspectives on the legislation introduced thus far will be helpful in your deliberations.

Senator MOYNIHAN. Mr. Davis, 15 minutes on the clock. That is precision for you.

Mr. DAVIS. I was watching it pretty closely, Senator.

Senator MOYNIHAN. May I congratulate you on an open, candid, and informative statement.

Mr. DAVIS. Thank you.

Senator MOYNIHAN. May I say, it is a refreshing contrast from some of the comments we have heard from Mr. Armand Hammer about this matter. We have tried, Congressman LaFalce, myself and others, to keep the demonology out of this, to be very careful in our statements not to identify individuals and only to concentrate on your company to the degree the situation specifically involved your company. It was disturbing, then to have Mr. Hammer, in the process of acquiring yet another company in Connecticut, say the costs were greatly exaggerated. He knows nothing about the costs except that he didn't want to pay them. It was not very reassuring. On the other hand, what you have said is sound.

I would like to pursue a point. First of all, to say what you I think implied, and repeat what I said, ours is not an effort to put the chemical industry out of business. To the contrary, we are deeply benefited by chemistry in this country and always have been but it is the side effects that have to be attended to. Do I take it that Hooker and others have developed incineration techniques which will put the landfill into a kind of pretechnological mode. That what was once the only available kind of approach to hazardous waste disposal is now something in the main you would not do. I wonder if you could think of your company's history, 20 years ago, how much of the toxic wastes would you say you buried in proportion to what you produced and how much do you bury today?

Mr. DAVIS. Well, Senator, I am not sure I can give you the exact figure.

Senator MOYNIHAN. Of course you can't.

Mr. DAVIS. Prior to 1961 we had to dispose of all our chemical residue materials by burial. We did not have an incinerator.

Senator MOYNIHAN. Unlike the suggestion, I gather, that has been made by a member, whose person shall be nameless in town, you didn't dump them in the Niagara River.

Mr. DAVIS. What we did do was put them in various landfill sites.

Senator MOYNIHAN. You had no incinerating technique, and so you buried them.

Mr. DAVIS. That is right. In 1961, we installed our first incinerator and we have expanded the capacity of that unit. We have disposed of over 200,000 gallons of what would otherwise have been chemical residue, liquid chemical residue materials, by the incineration process. During the last 5 years we have had a major plan underway, called "Operation Independence," which would make us independent of having to dispose of any materials in solid landfill waste sites. You can't quite do that but you can work your way toward that as the ultimate. In the last 5 years we have reduced this amount by 50 percent. That has been done by process modifications to get more materials and higher yields out of our processing so we produce less waste materials. And also we have expanded the ability to incinerate various waste materials.

Senator MOYNIHAN. So from 100-percent burial you are down to 50-percent burial?

Mr. DAVIS. I would say if you try to go from 20 years ago to now, we are less than 50 percent. But we are still disposing of waste materials.

Senator MOYNIHAN. And you would hope to get to zero?

Mr. DAVIS. I don't think we will quite make it.

Senator MOYNIHAN. But that is where you are trying to head?

Mr. DAVIS. Our programs are geared toward that.

Senator MOYNIHAN. So there has been a technological revolution in the management of this problem?

Mr. DAVIS. Evolution, I would like to say, rather than revolution.

Senator MOYNIHAN. What is the process? By incineration you break the complex compounds down into simpler compounds and discharge them into the air?

Mr. DAVIS. No; that is not quite right, because you don't want to convert a solid or liquid waste problem into an air pollution problem. The technology involved is raising the temperature of these materials to over a thousand degrees Centigrade and holding at that level for a couple of seconds so you can have a breakdown of the hydrochlorides. They break down into carbon dioxide and HCl, which is scrubbed out with an alkaline material which makes calcium chloride, which is a very harmless salt. And so you end up with carbon dioxide, water, and calcium chloride.

Senator MOYNIHAN. And you vent the carbon dioxide?

Mr. DAVIS. You monitor the stack to be sure there are no pollutants getting into the air.

Senator MOYNIHAN. And the salt is a salt?

Mr. DAVIS. A salt is a salt.

Senator MOYNIHAN. That is very impressive. That is clearly a direction we must head. We have the makings of bringing this problem under control through technology, and then we have the

problem of the residual of a century in which that particular technology did not exist.

Mr. DAVIS. Yes.

Senator MOYNIHAN. This clears my thinking as to what kind of problem we have here.

Mr. DAVIS. If I might just point out here, we have not addressed our solid waste disposal because of the problems associated with that. That is what constitutes the materials we are still sending to burial.

I might point out that Senator Daly of the State legislature has introduced a bill to introduce about this fall a funding—bond funding of \$150 million to be matched by the Federal Government for installing solid waste incineration units at various points around the State. I had the privilege of testifying before his group a couple of weeks ago and in concept we support that proposal.

Senator MOYNIHAN. That is excellent. And I would like to call attention to your statement, in which you proposed mixed funding for the ultrafund—it sounds like a Japanese import, ultrasuede. But you do accept the idea that the industry should pay its part in this and that a fee might be charged to chemical companies to encourage the research and development of recycling and waste reduction, and a fee charged to producers of petrochemicals and natural gas. I found your testimony exceptionally rewarding. I think you are trying to be a good corporate citizen here in Niagara Falls and you are doing so by advancing this art, and I think you are to be congratulated for that. I think we can see a situation in which this problem can come under control rather than merely compounding itself from generation to generation. And that is important.

Congressman LaFalce?

Representative LAFALCE. Thank you, Senator. I am going to be brief, for a number of reasons. First, this is a Senate hearing, and I am well aware of the deference that Members of the lower House show to people of the upper body.

Senator MOYNIHAN. We are not aware of it at all.

Representative LAFALCE. Second, we do have a great many witnesses. And, third, I have to give a commencement address at 5 o'clock at the Graduate School of Architecture at the University of Buffalo. I want to hear as many witnesses as I can before then.

Mr. Davis, I want to say publicly for the record that there has been a notable difference in the openness of the Hooker Corp. from the time you have come to Niagara Falls, and it has been all for the better from that time forward.

I also want to thank you for the recommendations you have made, all of which I think are excellent, regarding the refinements that will be needed in the superfund or ultrafund legislation that Senator Moynihan and I have proposed. I think most of your critiques would be applicable to the EPA proposals. However, some of them, I think, we should heed and perhaps make some changes in our bills that would take greater cognizance of the sophistication of the problem, as you have pointed out.

Because you have been helpful in suggesting refinements for our superfund legislation, I would like to pick your brains, if you will, regarding another approach that I have been taking. Senator, I

don't know that I have shared this with you yet. It seems to me that a lot of dumping is taking place in Niagara Falls, Niagara County, Erie County. In comparison with the rest of the United States, I would say we probably have more dumping in our two counties, especially Niagara County, than any other locality in the country. When is enough enough? When do you say, "Hey, we are just saturated with waste. We can't have any more here."

Now, when it comes to air emissions, the law says—and EPA has promulgated regulations—when you reach a certain level of contaminants in the air, then you are not permitted to engage in activity that is going to produce any more contamination of the air, a saturation level, if you will.

I have been working with EPA to try to develop a saturation level policy for the dumping of hazardous wastes. And I have been working with Mr. Jorling on this. There are difficulties, to be sure. But it seems to me that, No. 1, we ought to have such a policy; and No. 2, if any locality in the country should be eligible for that type of a determination that reached a saturation level, it ought to be Niagara County.

Now, perhaps this would not call for the total elimination of all dumping. That might go too far. But perhaps EPA could do something that the States can't do. The States can't say right now, "You can't bring your waste in from New Jersey and Pennsylvania, and what have you, to here," because that would be in violation of the interstate commerce laws of the United States. But the Federal Government could do that, and the Federal Government could say, because of the tremendous amount of waste that already exists, we are going to confine the dumping of wastes to that that is produced locally. So we wouldn't say that Hooker of Niagara Falls couldn't dump in this area, but under the saturation policy, we could say but you can't bring it in from New Jersey and Canada.

The problem is how do you determine the saturation level? And this is what I am having a tough time with EPA on right now, coming up with some criteria for that. And I just wonder if you would share your expertise with me on that issue, Mr. Davis.

Mr. DAVIS. Congressman LaFalce, without in any way trying to endorse your concept of saturation for waste disposal—

Representative LAFALCE. Oh, go right ahead.

Mr. DAVIS. I would like to point out one or two considerations that you might make when you are thinking about this. First of all, in the question of air saturation, you do have the benefit of self-cleaning movement of air. In the case of solid waste disposal, you do not have that capability. When it is in the ground, it is in the ground. If you are going to reach a saturation point and you determine there is some finite saturation point, what do you do then? Shut down all industry in the area because you can't saturate further? That would be rather difficult. That is a problem that in your concept you must think through.

Representative LAFALCE. That is why I suggest perhaps limit it to the waste that is produced locally.

Mr. DAVIS. But that saturation might continue to grow and grow and grow but only with the industry in the area. I just point that out as a consideration, because there is a slight difference between

air pollution saturation and what you are thinking about, solid waste pollution saturation.

Representative LAFALCE. Another feature of the bill we have introduced that differs from the EPA superfund proposal is we would also provide a mechanism for the licensing of future sites so that they would have to be socially acceptable locations rather than locations in the midst of homes or midst of activity. It would seem to me, as part and parcel of that, Government regulations as to the locale of a site, that in thinking of how much dumping has already gone on in a given location, we might be able to say there is no future dumping from out of State or out of area producers of waste. We are dealing with an embryonic area of the law, and therefore we are brainstorming and I am picking your brains.

Mr. TRUITT. May I respond in part? And I don't associate myself either in favor of what you are suggesting nor do I intend to denigrate it at all.

The first thing you have to do is you have to create an adequate data base within the continental United States of what it is you are talking about. When RCRA was enacted, the literature reflected it. It was designed to close the loop on environmental pollutants. You take it out of the water and air, now what do you do with it? EPA has not sorted out the quantum of waste available and being generated.

It seems to me that while your idea may or may not have merit, that the analogy between the nonattainment provisions in the Air Act is yet sufficiently untried to try to back that analogy into a different notion.

Representative LAFALCE. The development of national criteria would be very, very difficult, and that is why I am suggesting EPA would proceed on an ad hoc basis. In the same way, we did not develop national criteria for the determination of who should be exhorted to move from the Love Canal area. We used an ad hoc determination both in the first instance of August 1978 and in the second instance of February 1978 as that same type of ad hoc determination that I think makes Niagara account eligible for such saturation level finding without interfering with operation of industry in this area.

Senator MOYNIHAN. Well said.

Gentlemen, thank you for excellent testimony. We have some supplemental questions we would like to give to you. If you would prepare answers and submit them for the record, we would appreciate it.

Mr. TRUITT. How shall we be in receipt of the questions?

Senator MOYNIHAN. We shall hand them to you forthwith.

Mr. DAVIS. We thank you for the opportunity to present our views.

[Responses from Mr. Davis to written questions from Senator Moynihan follow:]



345 THIRD STREET, BOX 728, NIAGARA FALLS, NEW YORK 14302, PHONE (716) 278-7000

August 3, 1979

Honorable Daniel P. Moynihan
United States Senate
Russell Senate Office Building
Washington, DC 20510

Dear Senator Moynihan:

This is in response to the questions which were submitted to me during the Senate Committee on Environmental and Public Works field hearing which you chaired in Niagara Falls, New York on May 18, 1979. First of all, please accept our apology for the delay in providing the requested information. Regretfully, a thorough and complete response to your inquiry necessitated obtaining information from several different sources within the Hooker organization. As a consequence, it was not possible for us to respond as promptly as we would have wished. In any event, the questions submitted and our responses are detailed in the attachment to this letter.

I trust that the enclosed information satisfactorily responds to your inquiry. However, please do not hesitate to contact us if you require any clarification or additional information which we might have that would allow you to better understand your area of concern.

Sincerely,

A handwritten signature in black ink, appearing to read "Bruce D. Davis".

Bruce D. Davis
President
Industrial Chemicals Group

BDD:rm
Enclosure

Responses to Questions by
Senator Moynihan

1. You asked whether Hooker recognizes legal or moral responsibility concerning the Love Canal situation and what Hooker has done to carry out its responsibility.

Although Hooker does not believe that it is legally liable for whatever "damages" may have resulted from the Love Canal situation, we recognize an obligation to respond responsibly to the situation there. To that end, our technical employees have worked closely with local and state officials since late 1976 when the problem first came to light. In addition, we shared the costs of the City consultant who designed the remedial plan for the site. In 1978 we agreed to contribute to the City and County \$280,000 for remedial work at the Canal site which sum, at the time, constituted one-third of the total estimated remedial costs of such work. More recently, we have permitted the use of our incinerator at the Niagara plant to dispose of organic wastes being collected at Love Canal by the remedial program now in effect. Hooker will continue to cooperate with all responsible agencies in the Love Canal matter.

2. You have requested our estimates to "clean up" Love Canal and two other sites in the Niagara Falls area formerly used by Hooker in light of estimates by others that the cost would be \$150 million.

First, it should be noted that the \$150 million estimate was not made by any New York State official or Hooker representative. It was generated by a consultant to lawyers for the

-2-

Mead Corporation in connection with their efforts to oppose Occidental's proposed acquisition of Mead. In our judgement, the estimate reflects the partisan context in which it was created. In addition, the estimate is founded on the assumption that Hooker should be compelled to remove the waste at each site to some undisclosed location and incinerate it - a proposal that would have severe negative environmental impacts.

We have no first hand knowledge of the costs of the Love Canal program, but State officials have estimated the costs to be \$25 million. We have no basis upon which to disagree with this estimate. At the other two sites referred to in your question -- Hyde Park and S-area at the Niagara plant -- we are directly involved with remedial programs. At the Hyde Park site, the remedial work in progress should cost about \$2 million to complete. At the S-area site, an extensive monitoring and testing program is underway to identify the nature and extent of the remedial efforts which should be undertaken. Until the testing program is completed and the results have been analyzed, it would be premature to estimate the scope of work and expenditures required.

3. You have asked who should pay for reclamation and restoration of closed disposal areas if the "super fund" is not the source of these expenditures.

We believe that where the site does not present an imminent threat to health or the environment, more traditional remedies would be appropriate. These would include governmental action

-3-

to compel the owner of the site to undertake necessary actions, or in the absence of financially responsible owners, condemnation of the property by local and state authorities.

4. Your question implies that State officials have identified 19 other Hooker dump sites in Western New York which they classify as "priority one" (or the most dangerous) sites. You then ask whether these other sites are as "bad" as Love Canal and whether this is an accurate number.

The Interagency Task Force Draft Reports lists 36 priority one sites. Naturally we are unfamiliar with many of these sites. Because of the way the report was compiled, however, Hooker's name was associated with about 24 of these locations.

We believe that this draft report incorrectly characterizes the number of our sites. For example, 14 priority one sites are listed within our Durez plant in North Tonawanda. It unfairly takes advantage of our effort to provide accurate details. We hope that the Task Force will acknowledge this distortion in their final report.

Unlike Love Canal, priority one sites of which we are aware are not located next to many homes. Thus, these other sites do not appear to present problems to the same degree as Love Canal.

5. You have inquired about the tests being conducted by Hooker and the State on our workers at the Niagara plant.

We are presently conducting medical examinations of workers at our Niagara plant in conjunction with an epidemiology study

-4-

we have undertaken. State officials have distributed questionnaires to employees at our plant which seek information about their medical history. We understand that only a relatively small number of employees have completed the questionnaire -- a situation which raises problems about the "sample" which the State has obtained. We are prepared to share our data on a reciprocal basis with the State, but to date, the State has declined to do so.

6. You have inquired as to the status of our monitoring program at our 102nd Street site and whether it would be wise to have the same type of program as Olin has begun at a nearby site.

We do not believe that we have the same type of problem as Olin at our 102nd Street site. Most of the materials we disposed of at that location were inorganic in nature. This means that any resulting leachate should not be of the type that could create serious environmental problems.

We are on schedule with respect to our overall program for determining the extent of the problem, if any. Well drilling began in early July.

7. You have inquired as to what documentation exists to demonstrate that Hooker placed a clay cap on the Love Canal dump site and that the cap was removed by others.

There is good evidence to support our contentions in this regard. A number of long-term employees remember how we operated at the Love Canal and how careful we were in closing the site. A 1952 document written by a Hooker officer who

-5-

personally visited the site, contains the following written observations:

"No evidence of chemicals any place digging down 10' right to within 1' of the excavations."

"In places where we have dumped chemicals, the chemicals are almost unchanged in form and found 4' below top surface."

Subsequent to the transfer of the site in 1953, a school, houses and other developments were constructed adjacent to or in the vicinity of the site. Such construction may have disturbed the clay covering the waste materials deposited at the site.

8A. You have inquired how much will it cost to construct and operate Hooker's disposal sites in Erie and Niagara Counties if Hooker does all that the State and the Interagency Task Force recommend.

We plan to go far beyond any recommendations we have seen to date from the State and the Interagency Task Force. It is impossible at this time, however, to estimate the future costs involved because we have not yet been able to define the full scope of the various undertakings. This cannot be done until RCRA regulations have been finalized for future disposal practices.

-6-

8B. You have inquired how much it cost Hooker to operate now-closed disposal sites from the beginning of their use until closed and, specifically, as to the annual costs for 1960-1970 and for Love Canal.

We have no records showing annual disposal costs for the period 1960 to 1970 or for the period in which we owned Love Canal. We can tell you, however, that in 1978 we spent almost \$10 million for pollution control at the Niagara Falls plant. Furthermore, we estimate that since 1975, we have spent \$30 million for capital equipment for pollution control at our Niagara plant.

Senator MOYNIHAN. Is Senator Daly here?

Senator Daly, Mr. Davis mentioned your proposed legislation. I wonder if we could break into our hearing to have you come forward and speak to us on that matter and any other that engages your interest. You have been one of the persons in the State, who has led the legislative initiatives in this field and we welcome you to this committee, sir.

STATEMENT OF HON. JOHN B. DALY, STATE SENATOR, STATE OF NEW YORK

Mr. DALY. Senator, you are most gracious. I have a short statement.

Particularly, I think I will apply myself to that bond issue. In a bipartisan way we filed a bill in Albany calling for a referendum, bond issue referendum of \$150 million. It is our thought that really to do the job we want to do with this money, it would cost in the neighborhood of \$300 million. That is one of the reasons I wanted to appear before you, Senator, and say to you and Congressman LaFalce that I have got excellent legislation for you to carry to Washington with you, similar to the Pure Waters Act in sharing 50-50 of the State and the Federal Government in a new concept to our country, but not new to Europe. Of course, I am talking of regional waste disposal sites.

We feel that this is the way to handle toxic wastes in the future. We envision regional waste disposal sites using the most modern state of the art technology that is available—incineration, filtration, chemical fixation, solidification, reclamation—all in one site, regionally located in New York State, where all toxic wastes would be taken for handling and treatment to detoxify all of it, if possible. Generally, we know with present-day technology if we can spend the money, we can detoxify a very, very large number of those deadly chemicals. We are submitting to you a full report. We have completed our hearings; we completed yesterday in New York City the public hearing on the Subcommittee on Toxic Wastes, which I am pleased to Chair. We will be submitting an indepth report to you within a month.

But we feel that this regional waste disposal site is something that is exciting. It is an answer. We are going to stop putting those chemicals in the ground while they are toxic. We ask the Federal Government to join us in a mutual approach. Because I am sure after listening to both you gentlemen today and in the past, that you feel this is a Federal problem, it is a State problem. And I am saying to this we must apply both State and Federal assistance. We would ask that you give consideration to that approach.

By the way, may I say, as Congressman LaFalce knows me so well, I am a free enterprise sort of guy. But I have come to the conclusion that the State should operate the disposal sites, and with the help of bond issue to help pay off, by users fees and back to the generator of the chemical. We think it is an exciting approach. We feel it is very definitely worthy of strong consideration both at the State and Federal level. I might add I have already 100 sponsors in the assembly and over 50 sponsors in the senate. So it is receiving very, very good attention in Albany, and we would ask

that you consider joining us and helping us and let the State do it, but if you could help fund it with us, we would appreciate it.

Senator MOYNIHAN. I would like to say we want to see that report. I know you are a free enterprise sort of guy, but I am a professor sort of guy, and I will remind you that Adam Smith made very clear his view that there are always going to be activities which it can never be in the interests of the private entrepreneur to carry out. These are the proper activities of the State. This, I think, could very clearly be one. Another thing is that there is an economy of scale. The Hooker Chemical Co. can develop the technology in its own operations, take refuse up to 1,000 degrees Centigrade temperatures for 2 seconds and break down chemicals.

Well, a small firm may not be able to do it, and we may want to make possible for small activities to take place in this State. Hooker Chemical Co. was small once, too. May I just say the waste treatment plants which we routinely provide in wastewater treatment are a direct parallel.

Mr. DALY. The most salient point is the point you just made. We are getting a cost estimate of from 30 million to 150 million. And let's say it would cost \$100 million to build one of these plants. A small chemical company could not afford to put in this modern technology we feel we would want in the plant. That is the premise behind the idea.

Representative LAFALCE. First of all, I would like to commend you, John, for your very, very fine work. I understand the hearings you and your colleagues have conducted have been quite good and informative. I certainly think that your idea of regional waste disposal sites is worthy of the most serious consideration. I think, Senator, that it really parallels the provisions of our bill, which calls upon the EPA to identify all future waste sites and approve all future waste sites.

Now, the question of who should operate them, whether it would be the private sector or the public sector, is a very, very difficult one. It is a great leap from the existing situation where we now are to go from the private to exclusively the public, but perhaps some combination so long as the producers of the waste are always the ones footing the bill ultimately.

I also want to point this out, too, that we have been critical of New York State. But in comparison with the other States, New York State has been first in many areas.

This afternoon I had the pleasure of listening to Senator Moynihan speak of how New York State was first in building a thruway. Because we were first and floated bonds to pay for it, all the other States who came after us are now getting their thruways paid for in large part by the Federal Government. New York State, because they were first, is not. Well, New York State has been first in coping with the problems of hazardous wastes. If there is further legislation, we will be even further advanced in our first position. It is imperative, therefore, that the Federal legislation that we enact in the future take cognizance of what New York State has done and to the maximum extent possibly compensate for that, that there be some retroactive feature in the legislation: Again, something that distinguished our bill does; from the EPA proposed bill does not do that.

Mr. DALY. May I add, Congressman, I think we can hitch hike and help you on the legislation you are trying to pass, to help the people, on your superfund. Because one of the things you consider, I submit to you—

Representative LAFALCE. That could be a match job.

Mr. DALY. Match plus. You could get a fee, and you assess industry for a certain amount of the fund, a surcharge could be placed on the handling of chemical wastes at the site, which could be put into this fund.

Representative LAFALCE. Which, of course, would be pushed back to the producers. Also in our bill, too, the fee is based upon both the volume of hazardous wastes and the level of toxicity, which serves as an incentive for conservation, reduction of toxicity, for the elimination of hazardous wastes through incineration, et cetera.

I do have one question. What is the State administration position regarding—

Mr. DALY. We have a minor problem in that the Governor is pushing the transportation bond issue. I have been called by his office, very honestly, and we are meeting and starting negotiation, we say, hopefully on Monday.

Representative LAFALCE. We always know it is easier when the administration is behind you than when it is not.

Mr. DALY. The problem, of course, right now is which bond issue should go on. But constitutionally, we can only have one bond issue up for referendum in 1 year. We couldn't have both the toxic waste bond issue and the transportation bond issue. I might add that there was a delightful editorial in the Albany paper, strongly pushing the waste proposal. That is a constitutional limitation. We think the priority is in toxic waste. There are other ways we can do it: Instead of going to the bond issue, you could give the Environmental Facilities Corp., which would be the authority to handle these, the authority to go out and bond for, say, \$150 million, to raise the money that way.

Representative LAFALCE. Who would buy the bonds?

Mr. DALY. Well, New York State bonds are moving pretty well again, Congressman, thank God.

I realize your time element, and I do appreciate the opportunity you have given me. Rather than read my testimony, I will be glad to leave it.

Senator MOYNIHAN. It will be made part of the record. I would like to emphasize again a point you picked up and are obviously sensitive to. One of the unrealized effects of the environmental safety regulation of the last decade has been to give a comparative advantage to large industrial activities and make it much more difficult for small companies to compete or enter the field. It would be not the first time that you set out to do one thing and get something in addition that you didn't want at all, which is two automobile companies and three chemical companies and two power companies. This is a nice decentralizing device. I think you are to be congratulated, and we thank you for coming before this committee.

Mr. DALY. I thank you very much for the opportunity, gentlemen.

STATEMENT OF LOIS MARIE GIBBS, PRESIDENT, LOVE CANAL HOMEOWNERS ASSOCIATION, ACCCOMPANIED BY DR. BEVERLY PAIGEN, CANCER RESEARCH SCIENTIST, ROSWELL PARK MEMORIAL INSTITUTE

Senator MOYNIHAN. We now have the great pleasure of hearing from Ms. Lois Gibbs, who is the president of the Love Canal Homeowners Association. I believe, Ms. Gibbs, you are to be accompanied by Dr. Beverly Paigen, is that the case?

Ms. GIBBS. Yes.

Senator MOYNIHAN. I would like the record to show that our next witness has been nominated for Woman of the Year by Congressman LaFalce, and I would like to second that nomination.

We had a conversation at the Love Canal when was it, last October?

Ms. GIBBS. October 27, at 3:30.

Senator MOYNIHAN. Dr. Paigen, we welcome you, of course, and I hope you will feel free to join in the exchange.

You have a written statement, Ms. Gibbs. If you would like to read it, do so. If you would like to put it in the record and summarize it, do so.

Ms. GIBBS. First of all, my name is Lois Gibbs and I am president of the Love Canal Homeowners Association (LCHA). The LCHA is a citizens group consisting of over 1,000 families, representing more than 90 percent of the residents in the area. LCHA was formed to deal with the problems of living near the Love Canal dumpsite.

I would like to address the issue of the adequacy of present local, State, and Federal Government response to hazardous waste emergencies. At the start I would like to say that upon learning of the situation at Love Canal, the State moved very quickly to begin health and environmental studies. They also put into effect a remedial construction plan which would attempt to reduce chemical migration from the Love Canal. Although there are many problems which I could discuss, I will limit my testimony mainly to the experiences I have had dealing with the different State agencies involved at Love Canal.

Probably the most difficult obstacle to relieving the problems at Love Canal has been being the first. Neither the State nor the Federal agencies who could help were responsible for the situation. And neither wanted to take financial responsibility for cleaning it up. Arguing between State and Federal authorities over who should pay for what expenses, has continued since the first discovery of contamination. In fact, the remedial work for the middle section of the canal, which was supposed to start in mid-March, has been postponed to midsummer.

The reasons given are that the construction contract is going from emergency status, to an open bidding process. This is especially alarming since on March 9, 1979 thick, black, oily leachate was found running off the north section of the canal onto the street, and into our storm sewers. Remedial work on this section of the canal, which has not begun at all, must now await the decisions of bureaucrats while residents remain in a contaminated area which is not being remedied. This area approximately 8 feet by 10 feet square now lays open to the air, filling up with leachate and

making the ambient air unbearable. We were promised a cover over this area, possibly plastic, but to date nothing has been done.

Another problem is lack of objectivity of the scientific studies underway. The State is conducting major studies to define the health problems and the chemical contamination in the area. The outcome of these studies will be the basis of any decision to relocate families because of chemical contamination, resulting in health effects.

Twice, it has been necessary to relocate people living in different areas around the canal. In each instance, the State had to absorb most of the cost to buy homes, or temporarily relocate these families. However, many people with health problems remain, and many questions about the extent of contamination still remains to be resolved. Meanwhile, the State is conducting a scientific study, the results of which may end up costing the State many millions of dollars if the results indicate further contamination. This is especially alarming since continued announcements by State officials have been made that they do not intend to relocate any more families because of the lack of a cause and effect linkage between contamination from Love Canal and health effects found in the area.

The political and bureaucratic pressures to be absolutely certain of the results place great constraints on the objectivity of the scientists working on these studies. The very nature of the uncertainties of determining or establishing the significance of low-level contamination to many chemicals preclude obvious conclusions of cause and effect. Therefore, the Health Department, in an obvious conflict of interest, must make subjective recommendations to the politicians, who will decide what must be done. I want to stress that the objectivity necessary for good science would be near impossible in these circumstances.

Another problem is the lack of resources that the State and local authorities had at their disposal. The means and capabilities of the State and local resources were and still are simply not sufficient to protect the public health and welfare of the residents during such an emergency situation. In fact, the ability of a governmental body to react to public needs is limited by both laws defining its responsibilities and the appropriations limiting its ability to function. For example, it was necessary to pass special legislation to give the Commissioner of Health authority and financing to investigate the problems and determine actions to solve them; \$500,000 was provided, but it has been estimated that total costs will be at least \$22 million. The following comments provide other examples of necessary actions taken by the State which are very much out of the ordinary:

One, thousands of blood samples were taken from residents within a matter of a few weeks. The Health Department does not as a general matter perform laboratory tests on people of this magnitude.

Two, the large scale environmental sampling which was undertaken is not a matter of normal operating conditions especially testing for soil and sump contamination. The identification of unknown chemicals complicate this limitation even more. When dioxin, one of the most toxic chemicals known, was found in the

canal, the State was not able to determine with any degree of certainty just what areas are contaminated with dioxin. This is because of the expense and difficulty in measuring this chemical.

Three, very little is known about low level contamination of many chemicals. The Health Department made its best estimate of what the levels found in the homes may suggest. However, the best minds in the country should have been called in to evaluate what these levels of contamination mean.

Four, a large scale epidemiological effort was implemented to describe the nature of the health problems of the residents. This has only been duplicated in major disasters and is not part of the prior experience of the Health Department.

Although the State reacted to the circumstances as best they could, they were not able to provide the kinds of assistance needed in an emergency situation to protect the health of its residents.

Insensitivity of State authorities. In the situation where people are exposed to a threat, the magnitude of which no one understands, there are going to be many anxious moments. The residents have been very scared and emotional.

For example, prior to starting the remedial construction work on the south portion of the canal, I received a draft safety plan for the construction. Although it included precautions for the workers, no considerations were provided to protect residents from possible dangers as a result of the construction.

Eventually, a total safety plan was prepared and presented to the residents. However, the confidence in this plan was greatly shaken by a statement made by a State health department person who, when asked to comment on what he would do if toxic vapors were released through the neighborhood, he replied: "I wouldn't wait for the bus, I would run like hell." We are now constructing a new safety plan for the central and northern sections, but the residents feel there can be no safe plan for this area because of the different weather conditions. I personally feel one emphysema resident who lives on 101st Street will not survive the construction.

Another problem was the flow of information to the residents. A lot of data and information was given to residents without any explanation of what the data meant. Air values of chemicals found in each home were given to the resident without any interpretation of what the values represented. A need to understand the significance of these values was a major concern of the people. Many residents were asked to go for repeated blood tests without any explanation of why. With so many people afraid that their health was at risk, it would have greatly alleviated the fear of the unknown to have someone accessible to the residents who could answer their questions.

There were also many instances where neither the residents nor our representatives were invited to meetings held by State officials during which decisions that were affecting our future were being decided. We were often told that we were not "professionals" and that we would disrupt the ability of people to speak freely. These closed door meetings fostered mistrust, confusion, and gossip about the Health Department's concern for the residents.

Finally, I would like to say that we have faced many problems at Love Canal, some of which have been solved and many others

remain. I hope you who are here today have grasped a sense of the awfulness of our situation. Not only has our neighborhood become a test site for scientists but no authorities or agencies are willing to take a stand and help us.

I ask that you do what you can for us and do what you must to prevent what has happened at Love Canal from ever happening again. The next generation is at stake. Let's not harm that generation as we have been harmed by past generations.

I would be willing to answer any questions you may have.

Senator MOYNIHAN. I think that is lovely, moving and genuine testimony. I think that one of the things that was most inappropriate was the way in which the professionals in the field responded, when their own initiative in this matter finally ran out and they had to do something. The last people they wanted in the room were the people to whom this was a direct and personal tragedy. The thought, that somehow those who suffered in this calamity would not have anything useful to say about it, is an aspect of the professional mind that escapes me sometimes.

Congressman, I know that you are having to look at your watch because you have to be at graduation ceremonies. Would you like to ask questions first?

Representative LAFALCE. I will wait.

Senator MOYNIHAN. Dr. Paigen, did you want to say anything directly, or would you like to comment to questions?

Dr. PAIGEN. Yes, I have some direct testimony, too.

Senator MOYNIHAN. Then we will hear from you first.

STATEMENT OF BEVERLY PAIGEN

Dr. PAIGEN. I would like to make a few comments from the experience we have had in the Love Canal, some of the needs that are experienced by the people.

Senator MOYNIHAN. If I could interrupt, as you are a professional person, would you tell us what your affiliation is and what your specialty is?

Dr. PAIGEN. I am a cancer research scientist at Roswell Park Memorial Institute. I have a Ph. D. in biology and my research interest is genetic susceptibility to environmental toxins. I served on the Environmental Protection Agency's Toxic Substances Advisory Committee, and I currently serve on the Carcinogen Assessment Group of EPA.

I do have an extensive written testimony, which I will submit for the record with the health effects that I have found in the people at Love Canal.

Senator MOYNIHAN. That without objection will be made part of the record. [See p. 62.]

Dr. PAIGEN. I also have some charts I will show you if time permits. I would just like to make a few other comments with the kind of needs experienced of people living around a toxic dump. One is in the declaration of emergency, which is discussed in your bill. Generally, scientists accept a criterion for action for declaration of an emergency or for finding a degree of a probability of .05.

I believe in public health we should begin to change our conception of that. If there was a bomb threat in a public building, we do not need to be 95 percent sure that that bomb threat is a real

legitimate bomb threat before we take action. Likewise, in people living around a toxic dump, we cannot be 95 percent sure that there is an effect before we take action.

Senator MOYNIHAN. Could you just help me on that? Is that an epidemiological rule of thumb, of probability? Are we mixing up probability here with—

Dr. PAIGEN. Let me use jargon for a moment, because I am sure you understand the jargon. In all science, there is a *p* value calculated and a *p* value of .05 is often accepted as we have a certain amount of confidence that this effect is real. Now, this kind of *p* value is designed to guard against one type of error, which is that we are not going to say this is a hazard when it is not really a hazard.

Now, there is another kind of statistical error that can cure, and that is to overlook a hazard that is there. That is the kind of error I think we have to be more concerned with in the toxic waste dumps. The reason for this is that around most dumps you have a local hazard. Love Canal is unusual in that we have a population waste of a couple of thousand people to look at. Most dumps will have a population base of a few hundred. You are not going to be able to get *p* values of .05, even though the health effects may be real. I think we have to, when we talk about in your bill declaring an emergency, make sure that we are thinking of is not going in with the attitude that we go into like we do when we do laboratory experiments of let's be sure we have something, but go in with the attitude of let's go in and make sure we are not overlooking a real health effect.

Senator MOYNIHAN. May I say I think I follow your point, and it is obviously one to be pursued. A *p* value has to do with the probability of the null hypothesis not being correct and is it not the triggering mechanism by which epidemiologists behave?

Dr. PAIGEN. It is the triggering mechanism by which the New York State Health Department is behaving in this situation.

Senator MOYNIHAN. Help me on this. A *p* value is the degree of probability that the null hypothesis is not correct.

Dr. PAIGEN. That is exactly so.

Senator MOYNIHAN. Now, what does the health department do? What is the analysis that they—

Dr. PAIGEN. For instance, they looked at epilepsy—I think they did—in the wet areas versus the dry areas in Love Canal. Now, when I look at the epilepsy, I get a *p* value that is between .05 and .1, which falls outside the area. However, when you look at the individual case histories, I think it is pretty indicative that exposure to the chemicals at Love Canal are causing seizures in people.

The health department has said we find no evidence of neurological problems, including epilepsy. I believe there is considerable evidence in Love Canal for such an effect, but they have rejected it because of this very rigid *p* value.

Senator MOYNIHAN. OK. Now we know something. This is something to get our teeth into as we go into these hearings, what the epidemiological practice is.

Dr. PAIGEN. There is another need that has become very apparent in dealing with the Love Canal situation. The total pool of trained people who understand the health effects on the human

body of toxic chemicals in this country is very small. We do not have many toxicologists. Particularly when we are dealing with certain kinds of problems that we have experienced here in the Love Canal, we cannot find anybody who can come in and tell us what is going on. We think there are problems with bone metabolism in the Love Canal. We see a lot of people who say their bones are deteriorating and they don't know the cause. We have people with rare bone diseases. We don't know how to get our hands on a toxicologist that understands that sort of thing. We don't know how to get our hands on a toxicologist who understands whether chemicals can cause seizures. We don't know how to get our hands on a toxicologist who can diagnose chloral acne.

What I think we need at the Federal level is a responsible team. Do you know if there was an infectious disease, we have a center for infectious disease who fly in and take over and are all over the problem and solve it.

Representative LAFALCE. If I might interrupt, one of the things I have been pursuing with EPA also is the creation of an EPA strike force team that would have the capacity and mobility to come in and give a much more adequate Federal response of future Love Canals than it does thus far. The role of the EPA at best has been ill-defined. We have estimated it would cost approximately \$5 million to come up with this EPA strike force, which would be comprised of approximately 100 individuals, which would include scientists, biologists, engineers, lawyers, investigators, and so forth. I think this is somewhat similar to what you are suggesting.

Dr. PAIGEN. Yes, we definitely need this kind of ability to respond.

Representative LAFALCE. I also think that EPA will shortly be officially requesting that.

Senator MOYNIHAN. A nice point. Why don't we have enough toxicologists? Has it not been a hot field?

Dr. PAIGEN. It has been a rather new field.

Senator MOYNIHAN. It is a new field?

Dr. PAIGEN. There has always been toxicology of certain materials, like heavy metals that we have gone about for a long time. But with the rapid growth of organic chemicals and the lack of corresponding growth in training of toxicologists, the need has become much greater than the supply. And then with the enactment of the Toxic Substance Act of 1976, the need has begun to outstrip the supply at an enormous rate. And another need in this country is for training money to encourage more people to go into toxicology and also to encourage already trained Ph. D.'s and M.D.'s to move over into the field.

Now, Senator, I can summarize the health effects in three sentences. I can show you some charts, and I will listen—

Senator MOYNIHAN. Summarize them and show us the charts. We want to keep on schedule, but we don't want to miss anything.

Dr. PAIGEN. I would like to just briefly go over some of the things that I did in the Love Canal in response to a call for help from Lois Gibbs and the other members of the Love Canal Homeowners Association. They felt that the State was not being totally up front about the health data, and they conducted a house-by-house survey of the self-report of the individuals living in the house concerning

their health effects. This is the information I used to analyze the health of the people in Love Canal.

Now, there are several problems with this kind of data base. One is that the people who were reporting and the people who were collecting the information had a vested interest in showing that there were a lot of health effects, and there may have been some over reporting of disease.

Another problem is that laymen often do not understand the exact nature of the medical problem they have.

A third problem is that I did not have any resources to do this, so I was not able to go and verify each disease with physician records.

In order to overcome these problems, I only made an internal comparison in the neighborhood between homes that were heavily contaminated and homes that were moderately contaminated. And that was defined by homes that were along swales or historically wet places. I did not ever compare the disease in Love Canal with any sort of national statistics, because of the problems.

This does correct for the problems I mentioned, because the overreporting would take place equally in the wet and dry homes. I only concentrated on those diseases for which I thought the layman would know: Asthma, miscarriage, birth defect. I have much information that indicates other problems, as I mentioned, with bone metabolism, seizure disorders. I was not able to analyze that without trained medical people coming in.

One of the things we did when we got the data was to try to locate exactly where these old swales were. And for this we used old aerial photographs. This is one taken in 1950 when Hooker was still dumping and you can clearly see the path of an old stream bed here. With this and maps—and also the State health department did a very extensive amount of work on this—the homes were classified into wet or dry.

Just to give you an idea of what some of these swales or stream beds look like, here is one taken in 1958. You can see some young children in there. It is fairly deep and fairly wide. These were filled in with building rubble, which is much more permeable to the flow of liquids than the clay soil that underlies most of the neighborhood.

This aerial photograph of Love Canal today has on it in red and yellow the stream beds or swales that crisscross the neighborhood. On it, I have put a yellow dot over each home that was classified as wet. Some of these are wet because they lie exactly along a stream bed and some of them because there was an old lake in the neighborhood, there were some old swamps in the neighborhood. This was on the basis of work by the State Department, interviews with residents, work by Cornell University. Just to give you an idea of the people that participated in the survey, each home on this that participated is covered by a blue dot. You can see about 75 percent of the homes participated. Those that did not are evenly distributed throughout the neighborhood, so they did not affect any of the statistical analysis.

The health statistics I will present to you are an underestimate of the true disease in Love Canal, for several reasons. One is that I did not include the most heavily exposed families that were evacu-

ated. The reason I did not include them is because they were already gone and I was asked by the people remaining behind to help them. Another reason that this is an underestimate of disease is because this comparison between wet and dry is, I believe, a comparison between heavily contaminated homes and moderately contaminated homes. If we had a truly unexposed population, then we would see that even those people in moderately contaminated homes have an elevated disease compared to what we expect normally.

The third reason why I think the health statistics will show you are an underestimate is that people who had no health problems readily cooperated in this phone survey conducted by their neighbors, but there were people with serious health problems that I personally know about who did not cooperate in a health survey collected by their neighbors because they did not wish to divulge the information.

This first map shows you miscarriages, crib deaths, and still births. You can see here in black the old stream beds and here outlined in black are the swamps or lakes. I think it is apparent even without any statistical analysis that miscarriages, still births, and crib deaths tend to be concentrated in the wet areas.

This is a statistical analysis using pregnancy history of women before they moved to Love Canal, when they had a miscarriage rate of 8½ percent, compared to women after they moved to Love Canal in a wet home, and these women experienced a miscarriage rate of 25 percent. This is a threefold increased risk.

Birth defects is also concentrated along the wet areas. Here I have some statistics on birth defects. Here I have used both the official New York State numbers, which I had access to at this time, and my own. You can see that in the wet areas, New York State said that 12.5 percent of women had birth defects. My own numbers show that 20 percent of women have birth defects. In the dry areas it was 5 percent compared to 6.8 percent. I have been corresponding with the State of New York about the differences in their list of birth defects and my own, and I think the true incidence may lie somewhere in between the two numbers.

I asked whether the birth defects were concentrated evenly over time over the last 20 years, or whether the situation had gotten worse in the last few years. Most people feel that the flow of chemicals has been exacerbated in the last few years due to heavy precipitation. I just called all the children born in the last 5 years in the wet area. There were 16 such children; 9 of these children had birth defects, for a birth defect rate of over 50 percent. I was quite struck in this health survey by the number of people who complained of various forms of central nervous problems, ranging all the way from severe migraine headaches to things people call nervous condition to what I think is an excess in suicides and nervous breakdowns.

The only ones that I analyzed statistically, because I didn't feel I could handle headaches and nervous condition properly, were nervous breakdowns. And I limited these to people who had been admitted to a mental institution or people who had made a suicide attempt, and there were, I think—I am not sure—something like 18 to 20 such. I think almost all of them fell along a wet area. I

believe that there are probably central nervous system toxins contaminating the homes in Love Canal and some of the chemicals that have been found in the air of the basement are known to affect the central nervous system in workers.

The statistics on nervous breakdowns in the wet areas almost 9 percent of the adults have experienced a nervous breakdown compared to 2.2 percent of the dry areas south of Colvin Avenue, and 0.7 percent in the dry area north of Colvin Avenue.

Urinary disease is elevated in the neighborhood. This urinary disease ranges all the way from congenital defects in the urinary system to loss of kidney function to kidney cancer, to frequent and severe kidney or bladder infections. It is elevated along the wet areas. We even had one 7-year-old child die from kidney stones in October, and this child's yard borders on a stream where a storm sewer from Love Canal empties, and he played in that stream.

This is a picture of urinary disease, and you can see that it is concentrated in the wet areas.

The last disease which I analyzed carefully was asthma, and there is almost a fourfold increased risk of having asthma if you live in a home in the wet area, compared to homes in the dry areas. Many of these asthmatics have a history where they go away from the canal, their asthma clears up and if they go back, it gets worse. Of the people who evacuated who were asthmatics, most of them reported a tremendous improvement in their respiratory problems.

In this last map, I have added many of the diseases which I analyzed together and I plotted them so that you can get an idea of the distribution of disease in the area. I think this map is kind of interesting for several reasons. One of the old stream beds never intersected Love Canal and it had no disease on it. But look at this one. Almost solid disease in the homes along the old black creek.

In this major swale which intersects Love Canal and goes down to this old lake bed and continues down here, you just see a very heavy concentration of disease. This is the stream bed that did not intersect Love Canal that has very little disease compared to some of these others.

We also conducted a survey on the families who were evacuated to see whether there was an improvement in their health. Most of them reported a dramatic improvement in their health since they left. This test was less rigorous scientifically than this one because I did not conduct a survey before they moved. I only conducted it afterward. There may have been some beneficial effects of getting out of that high stress situation. Nevertheless, 67 percent of those families reported improvement in their health, and these health improvements fell into certain classes of diseases which I had already felt were quite important problems in Love Canal. One is ear infections. I believe there are chemicals in Love Canal that are depressing the immune system of people in Love Canal area because there is a very high reporting of upper respiratory infections, pneumonia, ear infections, and there is also a very high loss of hearing due to constant ear infections. Of the nine families that said ear infections were a major problem when they were living on Love Canal, all of them said that had disappeared. Many of them reported an improvement of upper respiratory infections.

Of asthmatics, 11 reported major improvement. Some of those, particularly those that do not have an allergic base underlying their asthma, have not had a single attack. Skin rashes have improved, depression, and headaches.

Senator MOYNIHAN. That was an extraordinary bit of epidemiological ingenuity in the best tradition of that profession. Dr. Paigen, are we going to be able to get those charts? I don't think you want to leave them with us, but—

Dr. PAIGEN. They are all in here, as well as the maps in here. I have extra copies here if some of the public would like them.

Senator MOYNIHAN. We would like to make sure they are part of our record.

Dr. PAIGEN. I do not have copies of the photographs, but I can provide smaller copies of the photographs by mail.

Senator MOYNIHAN. Fine. I think that is as good an example of epidemiology as I have run into in a long time. I would like to ask you one question just to make a point which has got to do with our legislation. It goes back to the point we were talking about earlier in the question of probability. It is the case in epidemiological studies that what is established is the probability of a relationship existing.

Dr. PAIGEN. That is true. You cannot prove cause and effect in epidemiology. You cannot insist on a direct cause and effect change; only a relationship.

Senator MOYNIHAN. Of course, there is an argument in science that you never can prove anything more than probability of existence. But leaving that aside—

Dr. PAIGEN. Leaving that aside, epidemiology is a little worse than when you go in the laboratory.

Senator MOYNIHAN. You can only prove a probability.

Dr. PAIGEN. Yes, an association.

Senator MOYNIHAN. An association at levels of confidence of 0.05 or 0.01 or in the rare situation 0.001, and those are the standard usages of the profession. So if you were to go into court and to say that I contracted asthma or a urinary disease as a consequence of my having lived in this place in association with these influences, all you could hope to do would be to establish a probability. But I want to press you on a particular point: The probability exists for the group; it never exists for the individual.

Dr. PAIGEN. That is absolutely true. I believe that in your bill, when I read it, I was a little concerned that you do not require too high a degree of proof, because that may never be forthcoming, and you may be cutting off the very people you are trying to help. The probability depends partly upon the difference in the health of the two groups you are looking at and also on the numbers you have. Most toxic dumps are going to be small in number.

When you deal with miscarriages where you have many miscarriages, then the probabilities for the numbers that I showed you were very good, P equals 0.001. Even when you are dealing with asthma, where I think there were 30 cases or 35 cases, it was very good cases. But by the time you get to epilepsy or bone diseases, where you have a dozen people, it begins to fall apart. Yet I feel those people are being injured just as much as the more common illnesses.

Senator MOYNIHAN. But you don't know, and this is the problem. Dr. PAIGEN. It is very hard to prove.

Senator MOYNIHAN. This is the problem of devising a legislative solution which, of course, we look for an insurance solution. You said when you got to asthma you had a P of 0.001.

Dr. PAIGEN. Asthma was very good, but epilepsy was above 0.05.

Senator MOYNIHAN. That still does not establish that if I have asthma, I got it in consequence of the Love Canal.

Dr. PAIGEN. No; it does not.

Senator MOYNIHAN. Because there is 1 chance in 1,000 that I did not. I want to make that point. So an insurance principle here seems very much indicated in the sense that the available information is always going to be at the levels of probability.

Dr. PAIGEN. Yes.

Senator MOYNIHAN. And the levels of probability are going to be vaguer and vaguer as samples and control groups get smaller: You developed a uniquely affected control group, but the probability of one such being found elsewhere is low.

Dr. PAIGEN. It is difficult to get a good control group. Sometimes an individual has other kinds of evidence; for instance, we have people who leave for a time and get better and come back and get worse. But often you do not have that kind of evidence. In infectious disease, they leave a trail, you can look at the antibodies in the serum. Chemicals do not leave a very good trace. You can take samples of blood and tissue and fat and mother's milk and analyze and analyze, and you cannot always find the traces of chemicals which are virtually certain to have caused the disease, because the exposure may have been in the past; the chemicals since they started the disease process going, they left the body, and you cannot get the hard kinds of laboratory evidence that you need.

Senator MOYNIHAN. I see.

Congressman LaFalce?

Representative LAFALCE. I have to interrupt, because I will have to be leaving shortly. Dr. Paigen, I was very interested in your remarks concerning the issue of causality, because as you will know from many meetings, trying to come up with legislation that deals with that issue has been one of my primary concerns. We are trying to break new ground by creating a Federal cause of action where one does not now exist for injury or illness caused by exposure to toxic substance, and also in order to overcome this hurdle of causality, we would give the Environmental Protection Agency, through our bill, the ability to determine that a—as I have defined it—requisite nexus exists between that chemical and the illness.

In determining whether a requisite nexus exists, I have put into the bill that the Administrator shall include within those factors he considers the hazardous waste itself, the etiology caused by such waste, time span during which the exposure is necessary to produce the physical injury, the geographic scope with which exposure to the hazardous waste is necessary, and such other information and data as the Administrator may determine appropriate.

I have tried to make it as broad in scope as I could. Then, once he makes this determination, a rebuttable presumption would be created. And once that is created, not just for this one individual but for all individuals that would fall within this classification,

then the burden of proving noncausation is on the defendant. The plaintiff, the injured person, will have established his case merely because he comes within the classification of individuals who have been exposed to a toxic substance where EPA has determined the requisite nexus to exist.

How could we improve that concept?

Dr. PAIGEN. I think that is a very good concept. It is new ground; it is difficult, and I think—

Representative LAFALCE. Everything we are doing here is new and first, both factually and in development of law which presents the problems.

Let me just point out a few things. I have to get going. There have been some differences of opinion between Dr. Paigen, for whom I have the greatest respect, and the New York Department of Health, for whom I have the greatest respect. I called upon the National Institute of Environmental Health Sciences to meet with both Dr. Paigen and DOH separately and jointly and tried to reconcile those differences. I have been in constant contact with them, Dr. Paigen. And since our visit, as a matter of fact, they visited me this week for a few hours in my Washington office. Dr. Rawls is now in Geneva and I expect him to return next week, and I would suspect that some statement from the National Institute of Environmental Health Sciences should be forthcoming within the next 2 weeks.

Dr. PAIGEN. I think that this situation has pointed up that the State health department in New York State or any other State is in a very difficult conflict of interest situation in regards to toxic dumps, whether it is, as in this situation, that they are frequently going to bear the cost of their determination or in a more general way that they do not want to drive industry from the area.

New York State Health Department is one of the finest in the country. It is headed by noted environmentalists. Yet their record has been less than outstanding in this particular situation.

We have Michigan, who might be considered one of the other best health departments in the country, and their record indicates that the PBB's was not outstanding. People have had many problems with the Colorado Health Department in the radiation problems. The State health departments are generally in a conflict of interest situation where to find that the health is affected has immediate financial implications for the State. Therefore, I do not think that they are in the best position to make the determination.

I have shown my material to many, many people locally and nationwide. I think that there has been a great deal of suggestions both while I was doing my study and since, and I think that certainly the data are solid enough to say that the New York State Health Department has minimized the health effects.

Representative LAFALCE. I would point out that there is one particular area that I am concerned with, Dr. Paigen, out of many. While we jointly fought to have an order declared that more individuals should be moved, particularly from the areas along the swales, the wet areas, as they are referred to, the recommendation was limited to pregnant women and children under 2. I do think that if there is a classification of group of people who should be moved above and beyond that—and this is one of the basic thrusts

of all your argumentation and advocacy of the Love Canal Homeowners Association—it clearly should be those women or families of childbearing age, who probably would have their most difficult moments at the very first weeks of conception when the embryo and the fetus would be most susceptible to whatever damages could come about from toxic substances. I am not a physician. I am not a scientist; I am simply a generalist but my native intuition tells me that if we were to be acting based upon the best medical factors as opposed to political or financial factors, we certainly would recommend that people who were desirous and hopeful of having children ought not to be living in those areas.

I have to run, but I would be remiss in going off to this commencement without extending again my praise to both of you. Dr. Paigen, your efforts have simply been outstanding. I don't know where we would be without you. They have been selfless. They have been above and beyond the call of duty, because they have all been before, in between, and after working hours and under sometimes the greatest of pressures. We are grateful.

Ms. Gibbs, not enough can be said in praise of you and the outstanding work that you have done. It is amazing to me how you have become so knowledgeable on this issue.

I really think she is deserving of an honorary doctorate's degree in physics, chemistry, biology, engineering, social sciences, et cetera—and politics, also, if one is given—because she has so well walked that line that must be walked between representation of her constituency, who is always asking her, "Why aren't we getting more?" and "Why aren't you yelling for more and screaming for more?" And reasonable presentations and approaches to the governmental authorities so that her credibility could be maintained. She has simply done that admirably.

There is no question in my mind that you should be one of the outstanding women of the year in America, and that indeed is why I nominated you.

Thank you.

Senator MOYNIHAN. I would like to nominate Dr. Paigen for epidemiologist of the year.

Ladies, we thank you very much. The committee is much in your debt, as is your community.

Senator MOYNIHAN. We thank our distinguished colleague, Congressman LaFalce for spending the afternoon with us. He, of necessity, must be off to the University of Buffalo.

Commissioner Robert Flacke, who is commissioner of the New York State Department of Environmental Conservation, is here and, as I understand, Dr. Glen Haugie is with him. Is that the case, Commissioner?

Mr. FLACKE. Yes, sir.

Senator MOYNIHAN. It is a privilege for this committee to have the two of you before us. As you know, we are trying to keep your time and the committee's to a certain minimum. If you have a statement and would like to put it in the record, Commissioner—

STATEMENT OF ROBERT F. FLACKE, COMMISSIONER, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, ACCCOMPANIED BY DR. GLEN HAUGHIE, NEW YORK STATE HEALTH DEPARTMENT

Mr. FLACKE. Yes, Senator Moynihan. We have a statement which we will not read but we will place into the record. [See p. 83.]

Senator MOYNIHAN. Without objection, it will be so included. Commissioner, the floor is yours.

Mr. FLACKE. It is a pleasure to be here with you today and to participate with you in trying to solve the toxic problems that exist both in New York State and in the United States.

As I said before, I will not read my written statement but I will try to basically summarize the State's activities, present to you what the State's activity is at the moment with respect to hazardous and toxic wastes and, as you requested, present a very brief comment upon your legislative proposal.

The State of New York has a wide variety of hazardous and toxic waste problems. It has become attention getting to discuss all of these toxic problems in the vein of the Love Canal and Niagara and Erie County, but I can assure you that our problems are wide and varied and go from New York City to Niagara Falls. The form that they take does not consist solely of one of the three disciplines; air, water, and land. Rather, the toxic problem exists in all three disciplines and its discovery and remediation must be discussed in that light.

One begins to categorize, when trying to problem solve, and the first category that the State of New York involved itself in was the category of how to solve what many consider as the old toxic waste problem versus what might be generated by industry and society now and in the future. I believe that your legislation addresses primarily the discovery of sites and the remediation of sites as part of this old toxic waste problem.

The other category is what happens in the future. And that, of course, we hopefully will address by the rules and regulations under RCRA. To that end, we have identified for the Environmental Protection Agency many problems that we have with the proposed RCRA regulations and we believe, based on our experiences in New York State, that these proposed regulations should be subject to a stringent review. I will mention but one today.

The technology that appears available within this country and within this world to prevent toxics from getting into our environment is not sophisticated enough to, with all assurance, allow us to avoid land disposal of toxics.

To that end, there appears a necessity within this country to address the issue of safe and secure landfills. The proposed RECRA regulations, I believe, require maintenance of sites for only 20 years into the future. Our assessment of that is that we must guarantee our citizens that if we put toxic materials in approved landfills, that they must be secure for an indefinite period of time, much more than 20 years. I think that we must be talking about 100 years at least.

What is the State of New York doing? We are trying to address toxics as an all-encompassing problem, not solely as an air, land, or water problem. We have started with the emergency situation at

Love Canal. We have developed a management program in Erie and Niagara County, whereby we have investigated the various toxics that were generated and tried to trace them to their present repositories.

We have taken that management technique and applied it to the State of New York and identified throughout the State a series of toxic depositories. We are in the process now of developing an assessment and remediation program to go into specific geographic and political areas of the State for intensive work. We recently discussed our problems in securing the funds necessary to do that inventory and assessment work with the Environmental Protection Agency. Although we don't have complete agreement as to what assistance we could get from the Federal Government, we have at least begun a dialog which we feel will lead to get some assistance.

It is our intention on the State level to have legislation that will aid us in the inventory, in the planning and remediation, and to take care of emergency remedial work. The State legislation is preparatory to either the passage of the legislation that we have here before us today or some other legislation that will assist the States.

I believe that the Governor will be revealing his proposals for the State toxics legislation very shortly. I am not privy to the exact form and await his release of the statewide legislative proposal. Turning to the legislation that is before us, we believe that it is comprehensive with respect to the environmental problems—and I will not address the health problems; I will leave that to Dr. Haughie here. The one specific thing that causes some concern for New York—and I believe it will cause concern for a majority of the other States—is on page 38. I don't know whether I have the correct bill. I have S. 1046.

Senator MOYNIHAN. Yes.

Mr. FLACKE. The legislation under location of new hazardous waste disposal sites, mandates specifically that the choice of site is done only with the advice and guidance of a State but appear not to allow the State to accept the responsibility of making the site selection itself.

Now, if I wish to emphasize that one may say; yes, it is very good to take the harsh burden of site selection off the State and put it on the shoulders of the Federal Government. But I am sure that there are many States—and I specifically speak for New York State—which would like to assume that burden and accept that responsibility.

Senator MOYNIHAN. What would you advise, if I may interrupt your testimony?

Mr. FLACKE. I would give the State the chance to make site selection itself rather than having site selection mandated by the Administrator of the Environmental Protection Agency.

Senator MOYNIHAN. The Administrator shall do it unless the State does?

Mr. FLACKE. Yes.

Senator MOYNIHAN. That makes complete sense to me, Commissioner.

Mr. FLACKE. That basically, Senator, is the specific comment that we have in regard to the legislation.

Doctor, would you care to comment?

Senator MOYNIHAN. And thank you, Commissioner. I will want to talk to my colleague, but I think you have it. This is something the Federal Government will do if the State government doesn't. It gives the State government freedom to do it if you want to. You wouldn't want anybody in Washington picking the site for you; you would do it yourself.

Doctor, let's hear from you, sir, whatever you have in mind, and then let's hear some more about some of these things we have been talking about. I don't know why we are asking all the professional people to reveal their personal lives and so, but I would appreciate it for the record if you would state your professional field.

STATEMENT OF DR. GLEN HAUGHIE

Dr. HAUGHIE. Yes, Senator. My name is Glen Haughie. I am a physician. I am a graduate of Harvard College, Harvard Medical School, and I have a master's in public health from the Harvard School of Public Health. I believe this is a university dear to you, sir, as it is to me.

Senator MOYNIHAN. Particularly that school of public health, if I may say. We will call you an epidemiologist.

Dr. HAUGHIE. Well, sir, I don't carry that title easily. I have spent a couple of years with the Center for Disease Control serving as an Epidemic Intelligence Service officer.

Senator MOYNIHAN. In Atlanta?

Dr. HAUGHIE. Yes. I was assigned to the State health department in Albany in late 1960's. I have served as director of the Monroe County Health Department of Rochester, N.Y., for a period of time. For the past 3 years, I have been employed—

Senator MOYNIHAN. We will accept your credentials, Doctor.

Dr. HAUGHIE. I have no written statement, Senator. I am prepared to answer questions that you may have of the department. I may offer a couple of comments concerning the discussion of the definitional terms requisite nexus. They are definitional because from an epidemiologist's point of view, I think what we are saying is, is there a causal association between exposure for a given chemical, or group of chemicals, and an adverse health effect. This, of course, has been the concern on our minds in the investigation of the Love Canal situation.

It is very difficult to draw conclusions on the basis of information or clinical data as it relates to a few individuals in making a judgment as to whether residence in close proximity to a chemical landfill is indeed associated with a higher risk of illness. As you are aware, illness is very common in many neighborhoods of the State of New York and elsewhere. We have sought to use the best scientists, both those that we employ in the department and the best scientific advice of various Federal agencies, as well as academicians from State universities and elsewhere, in the design of our investigations and in our analysis of data. We have sought their advice on four occasions before drawing conclusions from the data.

If I may, sir, I respectfully disagree somewhat with the comment you made earlier regarding the department's apparent lack of

effort to obtain information from residents of the area about their health status.

Senator MOYNIHAN. Doctor, I don't recall myself saying that.

Dr. HAUGHIE. I think the issue has related to our blue-ribbon committee. You may or may not be aware that we have convened a blue-ribbon committee on four occasions. This group of experts to which I just referred were gathered together in order to obtain their best expert advice on our data.

Senator MOYNIHAN. I am going to exercise the right of the Chair to say again, what was it I said? I don't recall—

Dr. HAUGHIE. I think, Senator, in response to a comment made by Ms. Gibbs concerning the closed door policies methods by which the department has—

Senator MOYNIHAN. Oh, I did say something to the effect I wondered about the question of excluding persons who were not professionals. I meant not in the least an aspersion on anyone who is a professional. You go ahead and correct the record.

Dr. HAUGHIE. I am intimately familiar with the concern Ms. Gibbs raised. I am also intimately aware of the numerous efforts we have made to conduct public meetings and to try to explain to a lot of very anxious people the nature of our studies, the progress or lack of progress, and the efforts I think the department has generally made in trying to unravel a most difficult problem.

Senator MOYNIHAN. Let me, then, correct that record to show that no aspersion was intended, and that none remains.

Explain that blue-ribbon committee to me. Did you have a question of data analysis that you wanted a jury to say is this the way to go about it?

Dr. HAUGHIE. From time to time, Senator, we asked physicians, toxicologists, statisticians, chemists, geneticists and epidemiologists, and others to give us advice on the design of studies, methods of collection of our data and also sought their advice in trying to interpret our data.

Senator MOYNIHAN. Would you tell me for this record—and we are trying to get a record here—what have you done in the way of data collection in the Love Canal?

Dr. HAUGHIE. Well, we have interviewed upwards of 700 to 800 families. These are families living in the 4- or 5-block radius of the Love Canal. Most of our efforts on the epidemiologic front have been devoted to trying to assess the adverse health effects, if any, on the unborn fetus. Specifically, we have used as measures of the health status of the fetus the frequency of spontaneous abortions occurring among women living in the area during the period of their residence in the area. We have looked also to determine the frequency and types of birth defects that have occurred among children born in the area. As a third measure of the health status of the fetus, which is perhaps less specific but quite sensitive.

We have examined the birth distributions of children born to mothers who are residents on the canal. We have observed a higher frequency of spontaneous abortions, birth defects and proportion of low birth rate in infants born of mothers living in homes situated on lands that historically were more likely contaminated, when compared with the experience of their neighbors living in homes less likely contaminated historically. These terms are oper-

ationally defined as homes built on swales or old stream beds or homes built on ponds that historically were located in the area.

More recently, we have interviewed families, approximately 250-or-so families, living north of the canal in another neighborhood, a neighborhood which, given the best information available at this time, we think is less heavily contaminated. We are presently analyzing that data as perhaps a neighborhood that may serve as a control to families living in closer proximity to the canal.

Senator MOYNIHAN. Fred Mosteller might say we didn't have any controls because it was only an experiment, but you think you are getting something there?

Dr. HAUGHIE. It is a long and laborious task in collecting the information. I think the provision of your bill which defines the responsibilities of the Board requiring the Board in section 3225(a) on page 22:

In making its determination, the EVCB may require any medical tests or examinations of the claimant necessary to confirm the diagnosis or determination of such physical injury or cause of such death.

In essence, we have been very sensitive to obtaining independent confirmation from private physician records and hospital records of illnesses or miscarriages, or whatever, reported by individuals living in the area. We believe that it is critical to verify reports of illness independently. As Dr. Paigen has pointed out, in some instances, there may be misunderstanding of some living in this area or other areas about what illnesses they may or may not have or have had in the past.

In brief, then, the effort of verifying reports of illness collected in our surveys is a major one as well but is a vitally necessary part of our research.

Senator MOYNIHAN. Do I take it that at this time you don't have an assessment of the health effects associated with the toxic conditions in this neighborhood, but that you hope to as an investigation now underway comes to a conclusion?

Dr. HAUGHIE. Our investigation continues. In early August, Senator, we concluded, on the basis of information available to us at that time, which was largely limited to the 97 families living in the first ring of families around the canal, that pregnant women and children less than 2 years of age in the first two rings should be relocated.

Senator MOYNIHAN. And that you did on the basis of the disparities between the experiences of those families and the general population?

Dr. HAUGHIE. That is correct, sir. We looked to the medical literature to identify information that would allow us to generate expected numbers of spontaneous abortions occurring among women of a given age group and of a given past history of other pregnancies.

In subsequent months we extended our survey beyond the first two rings of homes into homes extending out to 103d Street. In February, we amended the August order to recommend that pregnant women and children under 2 years of age living up to 103d Street similarly be relocated.

This conclusion was based on scientific evidence suggesting that women living in homes in this area built on historically wet prop-

erties, stream beds or pond areas, experienced a higher rate of adverse outcomes of pregnancies than did their neighbors living in homes built on historical dry properties.

Senator MOYNIHAN. You have not gone beyond this question of early childhood and pregnancy to questions of diseases of adulthood at this point?

Dr. HAUGHIE. We have carefully tried to sift through this information. We are concerned about the possibility of there being an unusual frequency of respiratory disease in the area. You may understand the difficulties of, again, trying to answer the question of whether the frequency of respiratory disease in the area is higher than one would expect, based solely on the fact that they are residents in the area and not because of occupational exposures or smoking histories, or whatever. We have such a study underway, primarily focusing on respiratory conditions among children.

Again, we are convinced of the importance of basing our conclusions on the best scientific data base that we can, and we will commit our data and our investigations to the scientific community for its critique, because we feel that the experience at the Love Canal will be turned to in future years as the toxic waste problem becomes more and more evident to us.

May I make just one final point on the nexus issue. I think that the points made on page 32 in describing the conditions or elements which must enter into the Administrator's findings of requisite nexus, points in B No. 3, the bottom of page 32, to a consideration of the timespan during which exposure to hazardous waste is necessary to produce a physical injury or death. Now, in your definition of physical injury in an earlier section, you make reference not only to injuries that occur as a result of accidents but also include illnesses that may occur as a result of long exposures. However, you also have a time of filing limitation, which is defined on page 20, which in essence says that an alleged victim may not file for consideration by the Board if the interval between the time of filing and the time the diagnosis was established exceeds 2 years. Now, the point here is that—again, Dr. Paigen made this point earlier—we are at a very embryonic stage of our understanding.

Senator MOYNIHAN. You don't like that 2 years?

Dr. HAUGHIE. I raise one consideration, and that is as our understanding of the risks of the chronic illness as a result of long duration exposure, perhaps at low doses, increases, that we may find individuals who are suffering conditions, not fully aware of the possible association with residence in the area or exposure to a toxic waste situation, only after some time has elapsed.

Senator MOYNIHAN. Let us think about that. We have a statute of limitations principle involved here. Things have to come to an end sometime.

Dr. Haughie, let me make a general observation if I can. I would hope I would be understood as having the very highest regard for the New York State Department of Health, and I don't mean that in the way it is normally meant. That phrase does not mean much in the U.S. Senate. Once Everett Dirksen described a nominee, President Eisenhower, and said he was a man Senator Dirksen held in minimum high regard. I hold the department of health in maximum high regard. As a matter of fact, the first sort of serious

work I had ever done was in a curious way in the epidemiology of traffic injuries, traffic safety problems. Moe Hampton, who paralleled your career, went to MIT and then went to Albany in 1956. He and I did some papers and ended up changing that program, I think. The one concern I had when I came up here last fall, is the department doing a study from which we are going to get some science. If it takes some time, it takes some time. You are not going to get many opportunities where you have a specific and a concentrated area and a recoverable history and resources of the New York State Department of Health.

So taking as much time as you require is fine. How much time are you going to require? If you say to me 15 years, I could live with that, if that is as long as it takes but, of course, it won't.

Dr. HAUGHIE. Of course, with your assistance, the Environmental Protection Agency has arranged for a grant to the Department of Environmental Conservation and part of those funds will be made available for health studies. That grant is for a period of 5 years. We certainly see a 5-year involvement.

Senator MOYNIHAN. When could we hope for some preliminary findings?

Dr. HAUGHIE. Well, we have provided two sets of preliminary findings, if you will.

Senator MOYNIHAN. One is that you have moved pregnant women out of certain places.

Dr. HAUGHIE. We expect to be able to announce the results of our investigations which related to the population north of Colvin Avenue or above the canal within a matter of a few weeks. But I hasten to add that we feel it also important to try to identify previous residents of the area and reconstruct the population, if you will, who have ever been exposed to conditions at the Love Canal, because, again, it is of great importance to get the best science out of this experience.

Senator MOYNIHAN. That was a first rate discovery in epidemiology, gentlemen, the lady who went to the Broad Street pump for her daily pitcher of water and came down with yellow fever with the rest of them.

Dr. HAUGHIE. Cholera.

Senator MOYNIHAN. And that is the kind of thing you look for and you find if you work at it.

Fine. Now, as between yourselves and Dr. Paigen, we have two transparently competent and capable persons and groups. Dr. Paigen has made, with no resources and with a sense of urgency in that community, a very elegant effort to create a control group in terms of wet-dry areas and to rely on self-reported illnesses that are identifiable. None is going to know much about bone metabolism, whether they have it or not, but asthma they recognize.

I would hope there would be a friendly cooperation. I am sure there is. Well, Dr. Paigen nods her head one way and you in another. I hope there would be a friendly competition. That I can be sure of, because you are both distinguished New Yorkers; all of you are. I don't mean to associate Dr. Haughie as the person on the other side of this dispute. There is nothing wrong with a little competition in the sciences, and I welcome you to the joy of it. It is constructive.

I want to make certain of one thing. You have all the resources you now need that you could reasonably expect to use, or that you could reasonably expect to get. Is there something we are not doing?

Dr. HAUGHIE. Well, we have communicated from time to time with the Environmental Protection Agency, seeking support, or making known our needs. We have called on the Center for Disease Control from time to time for their advice. Some of our requests remain pending. We are also presently seeking additional support from the State legislature in the supplemental budget for the environmental investigations in other locations.

Senator MOYNIHAN. Thank you. Doctor, I say this with the Commissioner present, too. If you need somebody to get impatient for you in Washington, you call me or John LaFalce in Washington. Particularly if you want somebody to get impatient with the Environmental Protection Agency, because their budget goes to our committee, and you would be surprised how they answer the phone. About the Center for Disease Control, you have to deal with the colleague network there.

I thank you particularly, sir. It seems to be a very important distinction about leaving this a State option and not having it done from Washington with endless results. God help the unhappy man or woman who has to make the choice anyway, but it can be done.

You weren't here earlier, but you know, I would like to repeat, as you leave, that I have the impression that we have gotten technologically to the point where a very great deal of waste disposal problem is in a certain sense behind us if we do it right. Incineration provides opportunities that just weren't there 30 years ago, and if we provide the sensible facilities, we may find that like most technological problems, there is a technological solution.

Mr. FLACKE. Thank you, Senator. The only thing I could add before I leave is we tend today to think of the toxic problem with relationship to its disposal on land, whereas the problem is really encompassing including the PCB's in the Hudson River and mirex in Lake Ontario. With respect to remediation, as you say, when we involve ourselves with the Environmental Protection Agency, we seem to be running into a considerable number of blind ends. For example, we were suggesting that certain types of funding be available for PCB's in the Hudson River and they disagreed. We suggest there is some work to be done in Lake Ontario and they say there is no fund available for that. We will give you our thoughts about that and when their budget comes before you, we hope you can see the problem.

Senator MOYNIHAN. Hurry because it is coming up now. Don't expect the nature of bureaucracies to change, but bureaucracies are organisms that respond dimly to the stimulations of the estradia.

Now, finally, this afternoon, we have Mr. James Sevinsky, who is the senior attorney with the Environmental Protection Bureau of the New York State Attorney General's Office.

You have been very patient, as befits a young lawyer. You have been hanging around courthouses for years, and will go on doing it. You have some written testimony?

STATEMENT OF JAMES A. SEVINSKY, SENIOR ATTORNEY, ENVIRONMENTAL PROTECTION BUREAU, NEW YORK STATE ATTORNEY GENERAL'S OFFICE

Mr. SEVINSKY. No; unfortunately, with the time available, I don't have a written statement. We would like the time to submit some later.

Senator MOYNIHAN. We will keep the record open for 2 weeks.

Mr. SEVINSKY. On behalf of the attorney general, I thank you for the opportunity to present these comments. I was going to give you a little bit of background at the outset on the attorney general's role on this problem today. In March of this year, after the inter-agency task force on hazardous waste report was drafted, Governor Carey requested the attorney general to investigate the State's legal remedies against the owners or operators of dump sites.

The attorney general acted immediately to assess the grounds for legal action against those who created hazardous dumps. In April of this year, the attorney general reported to the Governor that the results of legal research were highly encouraging. The attorney general believes legal grounds for action against hazardous waste dumps for improper disposal practices which threaten health and safety. The attorney general indicated to the Governor he is ready to go forward with legal action where appropriate and requested approval from the Governor to issue subpoenas in connection with the investigation and asked for funding to provide him with staff and resources needed to adequately address these complex legal matters.

The Governor is still considering that request. As a general principle, the attorney general said those who created the problems now existing in hazardous waste sites should pay for eliminating them wherever possible. The special hazardous waste project for which the attorney general is requesting funding is intended to fix the cost of cleanup of practices, improper disposal practices upon those who created the hazard we are now facing. Such necessary legal action, however, is only one facet of the total approach needed.

The scope, severity and complexity of the waste problem, as you have heard today, cannot be overstated. This problem presents a heavy burden. Steps must be taken to protect the public from hazards created from these past disposal practices as well as assuring waste techniques in the future will be effective in eliminating them.

The large costs involved and the competitive economics tied to State efforts require a major national focus on this subject. We are in agreement with you that the Federal Government must address this national problem. With respect to the bill, we support the basic concepts of your proposed legislation to identify and reclaim the hazardous waste sites existing. The funds for maintenance and reclamation programs and for compensation to persons injured, we believe, are very necessary, and also that Federal cause of action for damages caused by hazardous wastes be provided.

However, we would generally like to identify a few areas of concern and hope they will be helpful to you in further considerations on this bill.

First, we are very concerned that Federal legislation, this legislation and others, not limit or tend to limit any legal liability for these past disposal practices which may or may not be existing. The owner-operator liability concept which you have applied in this legislation is not all inclusive, as the legislation recognizes, and will be inappropriate at some sites and under some circumstances. The bill does not include generators of the waste in terms of liability or provide for apportioning liability with other third persons, other than owners or operators, who may have caused or contributed to a specific problem.

Also, we are concerned that clear, unambiguous provisions are necessary in the bill to insure that no possible legal causes of action are preempted or affected. The tone of the legislation, we feel, is important as well as the express terms, since many legal theories of liability for owners, operators, generators, and other third persons involved in these hazardous waste fields are developing fields of law and complex and not sufficiently litigated or set forth in statutes.

Also, the Federal right of action which has been proposed here speaks in terms of negligence, if negligence is established on the part of someone who owned or operated or whatever, cause an injury by hazardous waste. We are thinking in terms more of an absolute strict liability on the theory that one who undertakes to engage in an activity that is inherently dangerous as storage and disposal of hazardous wastes should be liable for the effect of those acts if it results in damage, whether or not they were negligent, they should pay based on the effect, be liable based on the effect.

Second, we would also like to insure that it is spelled out that the superfund, the 95-percent 5-percent Federal funding scheme, applies to emergency State actions under the police power or otherwise which does not specifically appear to be covered as part of the funding scheme for the State's plan for maintenance and reclamation. Likewise, this 95-percent Federal funding availability of this may slip through the cracks of the emergency assistance provision in section 3105.

For illustration, in order for a direct Federal emergency assistance to be taken, one of the determinations that would be required for the Administrator to make under this bill is that assistance will not otherwise be provided on a timely basis. If that finding, among others, is made by the Administrator, Federal assistance paid for out of the fund will obtain. That is fine, but there may be times when a State can act and when it is necessary for a State to act more swiftly than through the right of entry procedures that are set forth in your bill in the exercise of its power to abate an imminent hazard.

If that should occur, the State should know its action will be reimbursed by the superfund rather than making it incumbent upon the State to follow the possible more time-consuming procedure outlined in the bill to insure funding.

Otherwise, by not acting or forcing EPA to determine that assistance would not otherwise be provided on a timely basis, we would have likely an illogical result and probably contrary to the intent of the bill if the effect of these provisions was on these limited factual situations that result in times of emergency, eminent

hazard. It would actually provide a disincentive for the promptest possible State action if they felt the 95-percent reimbursement was not available in those instances.

Our next area of concern, we agree that present and future permit fees for disposal of wastes should establish incentive to reduce the generation of waste. We agree the source reduction theory is a major part of any reasonable man for the future. There may be some additional fees or disincentives, however, to the two methods described in the bill which could be applied more directly to the generators of the waste—without being specific, maybe on this feed stock or some other method even before disposal but at refinement phase, remedial stage.

It is possible it could provide additional funding and at the same time improve incentives to reduce sources of waste and encourage the development of technology to destroy residues. Also it would provide more funds possible to make the recovery amounts for environmental victims, as you can find them in the act, a little larger and perhaps more realistic in terms of harm that has occurred in the past.

The environmental victims control board, the way the nexus has been set up, has already been discussed today by others, and I think it should be noted and the public should be aware of the difficulty that is there in establishing a nexus. It may not be as simple to recover under this scheme as it would appear if that nexus is required to be established. The possibility may be to allow the individual to establish it if it has not already been established by the Administrator.

Last, having agreed in concept with the need for a speedy comprehensive Federal legislation, we would like to note that the other portions of the Resource Conservation Recovery Act passed in 1976 have not yet been implemented. It is the Attorney General's opinion that the regulations now proposed for implementing RCRA fall far short of providing for long-term proceedings the public needs and expects from the hazards of chemical wastes by, among other things, failing to provide adequate inventory control, site surveillance during operation, perpetual care provisions and landfill isolation integrity.

The Attorney General has submitted over 100 pages of detailed analysis and comments on these regulations designed to make them as stringent as possible and prevent presently operated sites from becoming a problem in the future.

In conclusion, we urge that Congress press for full implementation of RCRA as it now exists and other existing laws such as the Clean Air Act provisions which were mentioned earlier, in addition to promptly creating and implementing superfund.

Senator MOYNIHAN. Thank you, sir. You have given us some highly suggestive thoughts here. Karl Braithwaite, has been taking copious notes, as they are called. But you will put this in a proper brief for us, won't you? This is going to be a serious bit of testimony.

Mr. SEVINSKY. Yes, we hope to have time to submit some written comments on this if you are going to hold the record open for a couple of weeks.

Senator Moynihan. We will hold the record open for 2 weeks. If you can't get it in that time, if you will ask for an extension, we would do that, too. We want your attorney general's thoughts on this. We have some specific questions which I would like to give you and you might answer in the brief. But just one particular specific question right now. In your judgment, what is the situation of a person who owned a house on the Love Canal and has seen its value go from \$32,000, or whatever, to zero? What are that person's opportunities to recover that loss, and from whom would he recover it and how would he go about it?

Mr. Sevinsky. Well, I would like to answer that, but that matter, as well as many other specific sites, since you made it specific, is a matter that is under investigation.

Senator Moynihan. That is what you are worrying about, but would you give us in your paper, in your brief, if I may put it that way, some thought about where your present thinking on that subject is?

Mr. Sevinsky. Well, it will just be on the general principle that I express the comment that the attorney general feels that those who are responsible for creating the problem should pay for the cost of cleaning it up. Sometimes that responsibility is a bit difficult to assess.

Senator Moynihan. Where do you find that responsibility exactly?

Mr. Sevinsky. Right.

Senator Moynihan. We look forward to your brief. We thank you for your patience. I hope you have learned something, as this committee certainly has done.

Now I would like to thank you, Mr. Sevinsky. If you will come forward, we will give you these questions.

Is there any other person who wishes to be heard before we come to the conclusion? I am afraid my schedule is such that I have to catch an airplane leaving at this time, but I will allot 5 minutes to any person—I see three hands, and I will allot 5 minutes to each of those persons if they would be kind enough to come forward and will just make a simple line in order of the rows they are in.

Sir, you are in the first row. Come up and give your name. I will have to keep to a 5-minute rule.

STATEMENT OF ROBERT HAMILTON CALDWELL, UNIVERSITY OF BUFFALO

Mr. Caldwell. I don't think I will need five minutes, Senator. I am Robert Hamilton Caldwell. I am an experimenter and a full-time student at the University of Buffalo. One of the experiments I recently conducted, which was last summer before I moved to the city of Buffalo, has to do with—what I want to know is in Washington are you aware that the chemical pollutants that are discharged by the corporations, especially in western New York: besides the respiratory diseases people have sicknesses, flus, and so forth, we have a severe rash. Last summer I was afraid it was a form of psoriasis. It is severe in that county. I argued with a number of the doctors here at Memorial Hospital and St. Mary's Hospital and a few of my personal friends that I met in my travels. I spent 5 years in the Navy and traveled the majority of this country. I traced it

down to a disease that was known in Africa in the tropical islands in the early 1900's.

A group of scientists in this country went over. This disease was making people drop dead in the streets. It is caused from severe filth carried by flies, rats, rodents, and so forth. You can see maybe some of these marks on my face. Before you get on the airplane, maybe observe some of the people, observe these pimples, these rashes. The pores open up; these pollutants get beneath the skin and it causes severe rash on the head, on the arms, on the legs, anywhere where the body of the skin is exposed. I conceived a lotion that tends to cure it. It is like soap. It is the basic ingredients in the diet, a balanced diet, excluding the chemicals they inject into the meat and so forth, and so forth. But I want to know, in Washington are you aware of this, especially western New York? The plants have been here since the early 1900's, have been polluting this particular environment, the area geographically for years.

Senator MOYNIHAN. I would like to say this is something we would like to know more of. If you would give us a written statement—

Mr. CALDWELL. I am meeting with a group of scientists in 2 weeks and we are going to discuss this topic and a few other things. We are going to make up some papers on it and send it up to Washington.

Senator MOYNIHAN. If you will send the papers to Washington, D.C., they will be made a part of this record.

Mr. CALDWELL. I spent an awful long time researching this and in either county the health department refuses to believe this rash. I had to get up and move to Buffalo and demonstrate to the city of Buffalo what I was talking about before I got acknowledged for my work.

Senator MOYNIHAN. This committee does not refuse to believe anything. If you would submit your paper, we would be glad to have it as part of this record.

Mr. CALDWELL. Would you be able to leave your address in Washington, D.C.?

Senator MOYNIHAN. If you will just come here and send it precisely to that address, Washington, D.C.

Now, sir, would you come forward. If you will give your name to the committee.

STATEMENT OF CHESTER RICHARDSON, GRADUATE OF MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Mr. RICHARDSON. My name is Chester Richardson.

Senator MOYNIHAN. We welcome you.

Mr. RICHARDSON. I am a graduate of the Massachusetts Institute of Technology in electrochemical engineering. I have had over 40 years experience in the chemical industry. I made up this statement before I heard what went on today here, of course, and I will give it to you at the end. But I want to say that I would like to rebut some of the statements made about the available technology. I will read this first.

I am pleased to hear that such a bill has been proposed in Congress. It will serve a very much needed purpose. But it should

go further. A strong law should be passed mandating complete treatment of all chemical wastes, and solidification and confinement of radioactive wastes.

Since there is no such thing as a secure landfill, the final solid products of chemical waste treatment should be harmless and inert, capable of being buried anywhere. They could even be used to make roadbeds or concrete aggregates. The liquid and gaseous final products would be only pure water and carbon dioxide. Many other components could be recycled to the chemical industries.

The technology of such treatments is well-known and available. Its cost is a legitimate charge against the cost of production of the main products made by the generators of such wastes.

Radioactive wastes should be solidified and stored in thick walled concrete containers or silos, preferably remote from populated areas. The present scandalous ways of burying and storing liquid wastes in corrodible containers should be stopped immediately.

The costs of these preventive measures is higher in the short run than the inadequate partial or no treatment plus burial. But in the long run, it is much cheaper than the ridiculously expensive present schemes of digging up the burial sites and treating them, to say nothing about the far more important result of the lethal and health hazards involved.

I have my New York State license, professional engineering. I want to rebut some of the statements that I heard.

Senator MOYNIHAN. Please do, sir.

Mr. RICHARDSON. That the technology is not sophisticated enough to do the job, that they just won't pay for it. The technology is available if they are willing to pay for it to render every waste product, final waste product after treatment, inert and harmless and prevent all these things, such as the Love Canal and the 30,000 others that you mentioned earlier.

Now, I say that this should be in addition to the fundamental purpose of the bill, which is to take care of things that have now got to be cleaned up. That I am all for. Of course, I agree that it is a Federal proposition, because there is no point in having one State—

Senator MOYNIHAN. One of the oldest lessons we have had in this field of public health is, that if you began in the factory laws in the early 20th century, that there is an innovative cost of these matters that will prevent anyone from doing it until everyone does it. That is the Federal principle here.

Mr. Richardson, I thank you for the most succinct and possibly the most important testimony we have had told. I appreciate very much your saying that the technology does exist, the question is putting it in place.

Mr. RICHARDSON. Just pay for it.

Senator MOYNIHAN. And make the cost a part of production, because eventually it is a cost that society absorbs, and possibly higher if it is not done in the first instance.

We thank you very much for coming here.

Now, sir, a final gentleman in the third row, we recognize you. Please come forward. If you would give your name to the committee, we would be most happy to have you.

STATEMENT OF ROBERT POWERS

Mr. POWERS. My name is Robert Powers. I am a 31-year former employee of the Hooker Chemical. I was retired last July on disability on account of being legally blind. I think you referred to me when you stated that someone said there were thousands of gallons of acid dumped in the Niagara River. I made that statement at the New York State hearings on hazardous waste. I think the reference was made to me. It was a fact Mr. Davis—I do not wish to call Mr. Bruce Davis, say he is lying. I have stated that Mr. Bruce Davis is not aware of many things that go on in the plant. That is the point I wish to make, that he is not aware of them. That may not be his policy to dump, but up until the time I left, thousands of gallons of acid and other residues, all types of waste, were dumped into the river, because I did a lot of it, and I know and I am willing to take a lie detector test any time to prove that I did it, and I was told to do it. There was a special number there that you called, a pollution number, telephone number that you called when you were going to dump certain things into the river. The purpose of this number, what it was, I don't know. Myself, I believe it was in case somebody complained about dumping in the river, they could have an excuse. Or on the other hand, it was to eliminate what I have said has occurred in the Hooker Chemical Co., that if you mix chemical A and B, you can form chemical C, which can either be highly explosive or form a very dangerous gas. Both of these things have happened in Hooker. So possibly this here called the pollution number was to establish the fact that someone was dumping, so if you called they would tell you don't dump now. That is the point I wish to make, sir.

Senator MOYNIHAN. Mr. Powers, we thank you very much for making it, and that point will be drawn to the attention of representatives of Hooker Chemical Co., who began this hearing.

Mr. POWERS. But when someone talked about dumping thousands of gallons, that was me. I was the dirty bird that done it. But I feel there was something that should be said. I feel if Hooker had been honest and aboveboard and stated that we had done these things, I know for a fact that things have changed there now. They are improving but there are occasions when there are certain materials that they can be harmful to protection that will end up in the river. To this very day that will go on, because there are two-way valves. There is one valve back to the container and there is a valve that goes into the city sewers. Our city sewage-treatment plant is toxic, which means that somebody is putting something in the river. Thank you, sir.

Senator MOYNIHAN. Thank you. And with that, we are an hour overtime. It has been worth it entirely. I have no alternative but to close. Miss, did you want to be heard?

STATEMENT OF GRACE MCCOULF, RESIDENT OF LOVE CANAL

Ms. McCoulf. One brief statement.

Senator MOYNIHAN. Come up and then I think this will be the end. Would you introduce yourself?

Ms. McCoulf. I am Grace McCoulf. I am a resident of the Love Canal.

Senator MOYNIHAN. We welcome you to this hearing.

Ms. McCoulf. I am one of the mothers of childbearing age in the area, as are many other mothers, or possibly. I have a daughter with a birth defect now, as many other parents do in the Love Canal. The decision that was made by New York State to evacuate pregnant women and children under two was ludicrous, because of the fact that they are not considering the damage that is already done after the first 3 months. It is the most dangerous period. New York State is in fact practicing birth control, telling us not to have children.

This is basically my statement, and I feel that they should reconsider this and be more humane.

Senator Moynihan. I will see that this statement is specifically sent to Dr. Axelrod.

Ms. McCoulf. Also, I have a statement from my doctor which says, "Mrs. McCoulf is under my care. She is now contemplating pregnancy. In my opinion, because of evidence available at this time, relocation would be of benefit to this patient." This was dated in March. It was read to Dr. Axelrod, who told Lois Gibbs—she presented it for me—that we should just weigh the risks of having another child or, in my estimation, having a child with a birth defect with the figures that you have seen presented.

Senator Moynihan. I will see that Dr. Axelrod has your statement and we thank you for giving it.

With that, the hearings will adjourn.

[Whereupon, at 5:03 p.m., the committee was recessed, to reconvene subject to the call of the Chair.]

[Statements of Dr. Paigen and Commissioner Flacke and statements from others submitted for the record follow:]

HEALTH HAZARDS AT LOVE CANAL

Testimony Presented to the House Sub-committee on Oversight & Investigations

March 21, 1979

by Dr. Beverly Paigen

Roswell Park Memorial Institute

Introduction

My name is Beverly Paigen. I am a cancer research scientist at Roswell Park Memorial Institute in Buffalo, New York. Roswell Park is part of the New York State Department of Health. I have a Ph.D. in biology and my research interest is genetic susceptibility to environmental toxins. I served on the Environmental Protection Agency's Toxic Substances Advisory Committee from 1977-1979. I currently serve on an Environmental Protection Agency group (the Carcinogen Assessment Group) that makes quantitative risk assessments of hazards from cancer-causing chemicals.

Summary of Health Effects

The studies that I will present concern the health hazards experienced by the people still living from one to five blocks from the Love Canal dump site. I will present information that leads me to conclude that toxic chemicals are presently migrating through the soil along the paths of old streambeds that once criss-crossed the neighborhood. Families whose homes border these old streambeds show an increase in several health problems including miscarriages, birth defects, nervous breakdowns, asthma and diseases of the urinary system. These studies have led me to conclude that a minimum of 140 additional families should be evacuated immediately and evacuation may need to be extended to as many as 500 more families. In addition, the results raise questions about whether the presently planned remedial construction to prevent further outflow of toxic wastes is adequate.

Methodology

Originally, the State of New York investigated miscarriages and birth defects in the residents living in rings 1 and 2 immediately surrounding the Love Canal and concluded that both were increased. On the basis of this they declared a health emergency and evacuated 239 families from rings 1 and 2. The residents left behind living in the area from one to five blocks from Love Canal also felt that birth defects and other diseases were higher than should be expected in their neighborhood. These residents began collecting information in an informal way on diseases in the neighborhood and plotting these on a map. The diseases seemed to cluster in particular areas of the neighborhood.

Older residents suggested that the clusters seemed to follow the path of old streambeds that had intersected the Love Canal many years ago and had been filled when houses were built. At this point the residents contacted me for help since I am known locally as an environmental scientist. I discussed with area residents how to collect health information in a scientifically acceptable way. They put aside all the information they had gathered and started making a systematic phone survey to each home, collecting information about the number of persons in each family, the length of time they had lived in the Love Canal area, and the health problems experienced by the family. More than 75% of the homes cooperated in the survey. This information provided the data base I used. I should point out that this survey suffers from several problems. First, a layperson reported diseases to a layperson and some of the people involved may not understand the true nature of their illnesses. Second, both the people reporting and the people collecting the information have a vested interest in the outcome and there may be over-reporting of disease. And third, I did not have any resources so I could not verify independently the reports of disease with physician records. To overcome these problems I concentrated primarily on those health effects that are diagnosed by a physician and that the layperson knows by name. To correct for over-reporting I used internal controls in the neighborhood. I will present the health effects in 3 categories of confidence: the first are those diseases for which there is clear and convincing evidence of an increase; the second category are those diseases that are probably elevated but which have some problems with the data; and the third category includes health problems for which there is suggestive evidence, but which I was not able to evaluate for lack of sufficient information.

The Swales

The first step was to locate the old stream beds. This was done by examining old aerial photographs and geological survey maps, obtaining photographs from residents' family albums, and talking to older residents. In addition, the State of New York sent interviewers from home to home to determine which houses had been built in historically wet or swampy areas. During this process we discovered that in addition to the streams, there had been a lake and several swamps in the neighborhood. I have here, for instance, a photograph of the Love Canal area (Figure 1) taken in the early 1950's at the time that Hooker Chemical was still dumping toxic wastes. The canal is partially filled. Here is the path of a stream bed that intersected Love Canal. Area residents tell us that this could flow in either direction. When the Niagara River flooded in early spring it flowed to the north. At other times of the year it flowed to the south. Here is an old family photo from 1958 which shows two children playing in the stream bed (Figure 2). It appears to be about 10 feet deep and more than 20 feet wide. The soil in this area is clay and is relatively impermeable to the flow of liquids. When the area was developed, the streams were filled with building rubble through which water flows easily. The result is that today, even though there is no surface evidence of these old streams, liquid contaminated with toxic chemicals is migrating along them underground. The next photograph has on it in red the stream beds that were

stream bed indicated by arrows

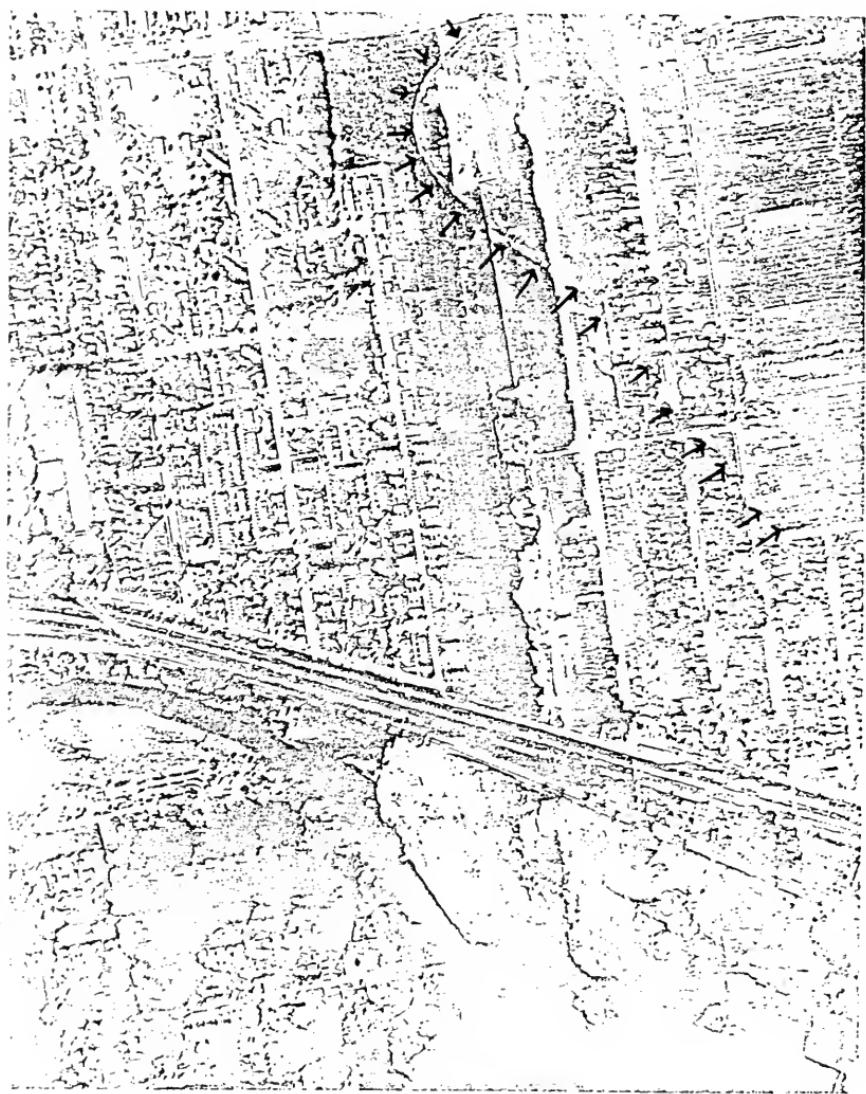


FIGURE 1. Old Stream Bed in Lovy Canal area

- 4 -

- 4 -

Figure 2

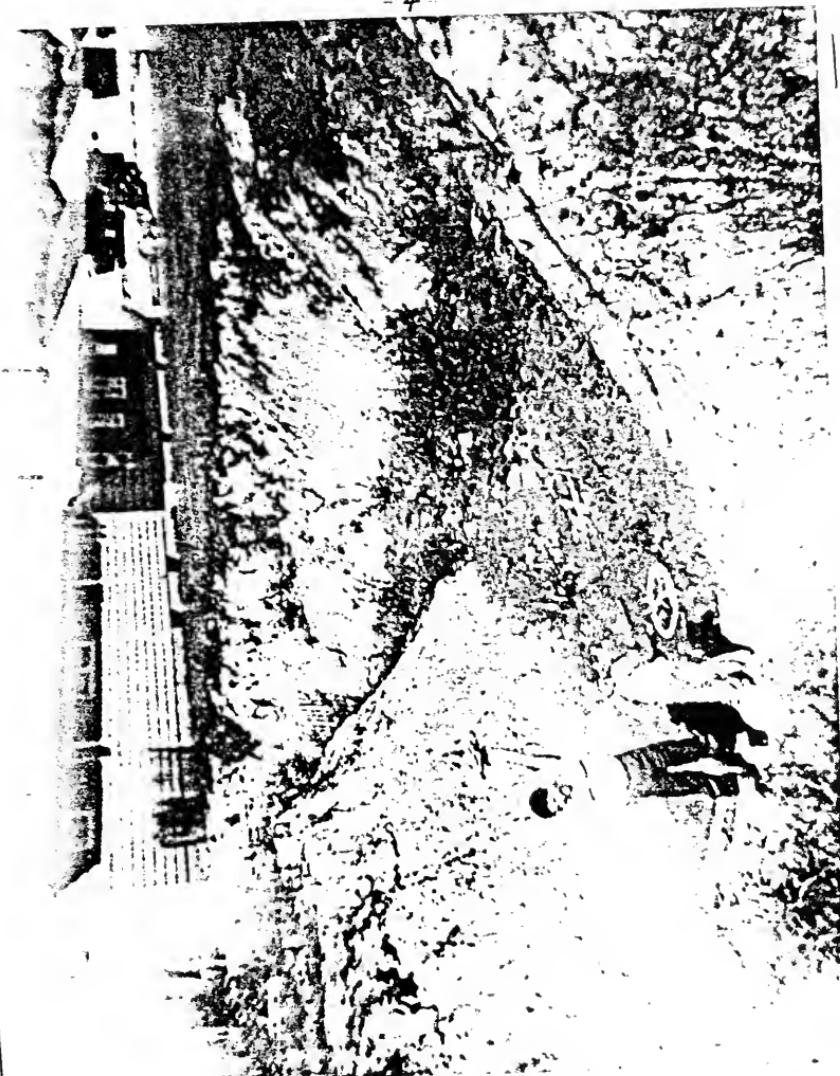


FIGURE 2

- 5 -

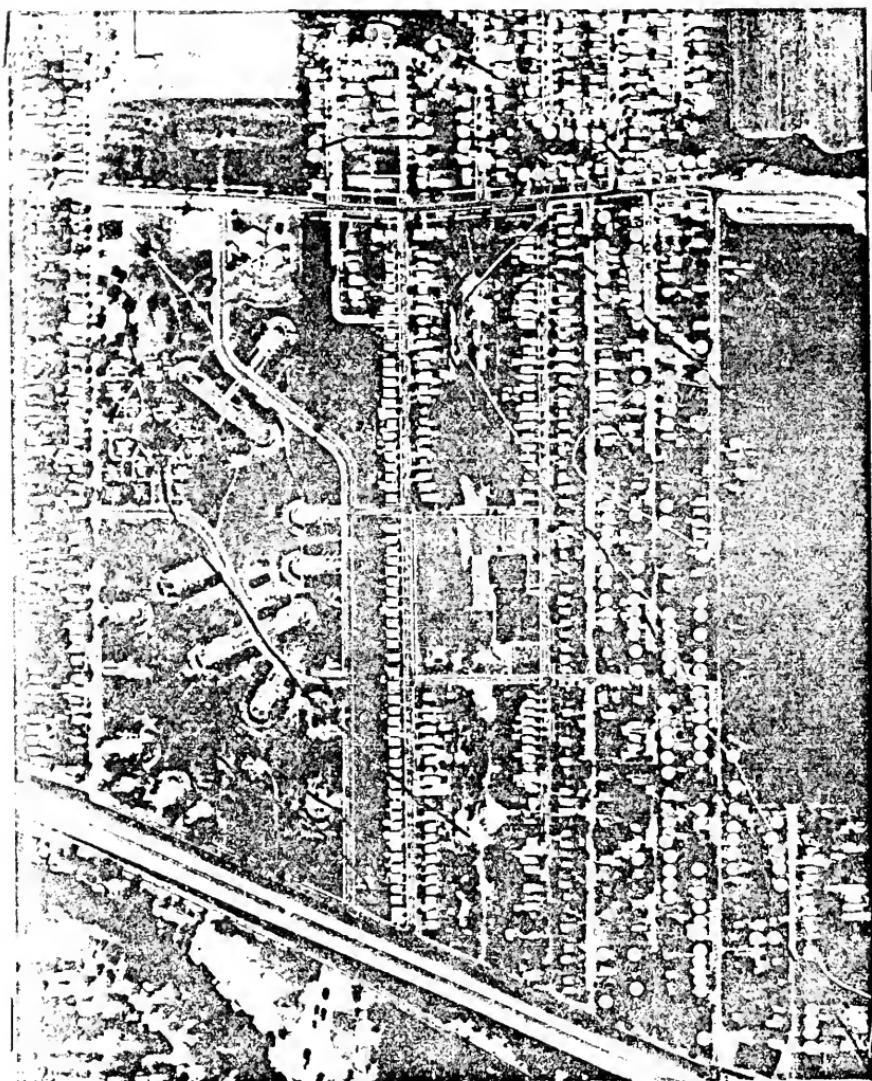


FIGURE 5

present in a 1938 aerial photograph (Figure 3). In yellow are the stream beds present in a later aerial photograph indicating that some relocation of streams occurred during the construction period. The yellow dots in this photograph indicate each home that lies along a stream bed or in a historically wet place, that is where a lake or a swamp was. In the health studies which I will be showing you, I have compared the disease incidence in these homes on historically wet areas with the disease incidence in homes in dry areas. The collection of health data to the west of the canal are still not complete.

The data I will show you are limited to this area (indicate on photograph). The first map (Figure 4) shows the homes in the study area; each home that cooperated in the study is covered by a dot. More than 75% of the homes participated in the survey and the homes which did not are randomly scattered through the neighborhood. At some points the study area was divided for statistical purposes into north and south along this line (indicated on map).

It is important to keep in mind that the health effects I will be presenting are probably serious underestimates of the true health effects. One reason is that I don't have a normal control population. I am comparing a heavily exposed population - those in wet homes - to a moderately exposed population - those in dry homes - and I don't have any unexposed population. A second reason is that my data usually do not include the evacuated families who were the most heavily exposed. A third reason is that people with no health problems readily cooperated in the survey, but some families with serious health problems did not wish to participate in a survey conducted by their neighbors.

Toxicity to the Very Young

One of the most susceptible groups in the general population to the toxic effects of chemicals are the very young. In the Love Canal area, miscarriages, still births, and crib deaths are increased. This table (Table 1) indicates total pregnancies and miscarriages verified by physicians in these women before they moved to the Love Canal and after moving to wet areas in Love Canal. The frequency of miscarriages before moving to Love Canal was 8 1/2% and this increased to 25% for women when living in Love Canal homes in wet areas. This is a risk 3 times greater for women living in the wet areas.

This map (Figure 5) indicates each miscarriage, still birth, or crib death with a blue dot. I have omitted the houses and streets to protect the identity of the individuals who gave confidential medical information, but I have indicated the stream beds and have outlined the swampy areas. Each dot is about the width of a house lot. The stream beds are indicated by a line even though they have considerable width. Miscarriages are more frequent in homes lying in wet areas than in the homes in dry areas.

- 7 -

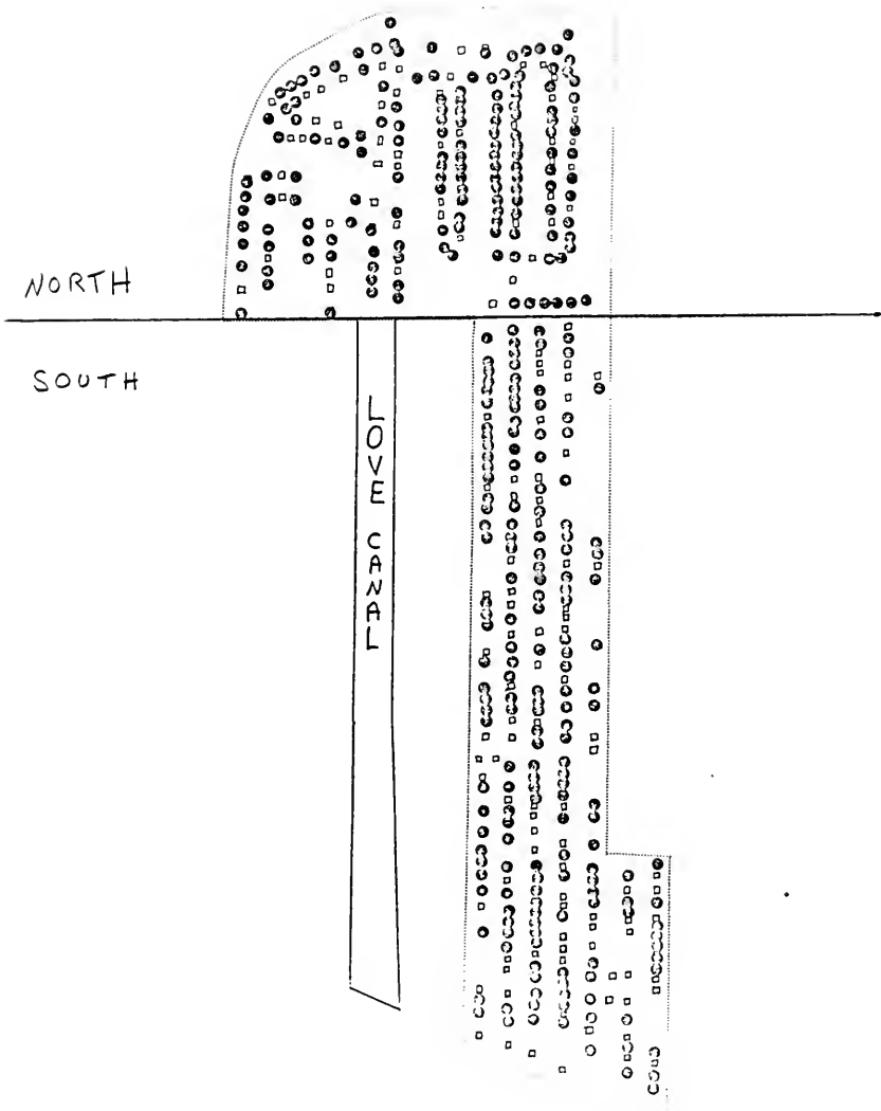


FIGURE 4. Study Area. Each home that participated in survey is covered with a circle.

Table 1

MISCARRIAGES IN WOMEN LIVING IN LOVE CANAL AREA

	<u>Number of pregnancies</u>	<u>Number of miscarriages</u>	<u>%</u>
Before moving to Love Canal	714	61	8.5%
After moving to wet area of Love Canal	155	39	25.2%
Relative risk	3.0		
chi square 35; probability that difference is due to chance is much less than .0005			

- 9 -

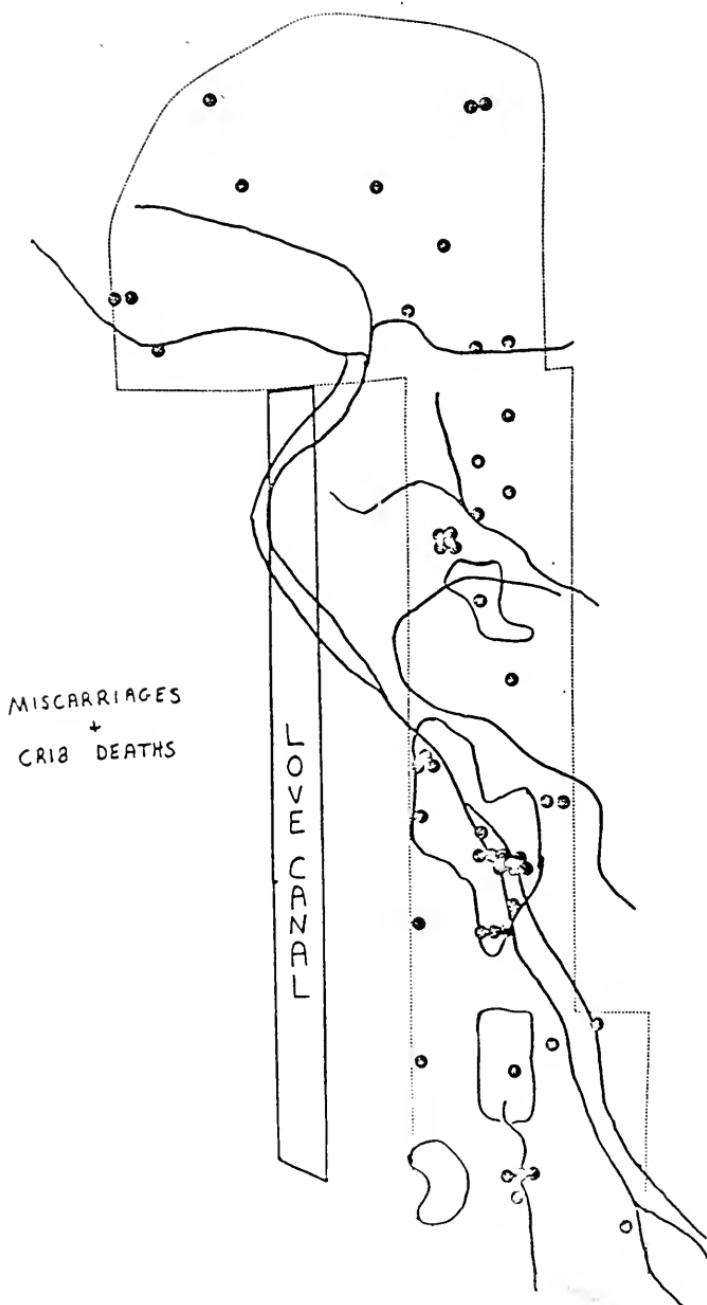


FIGURE 5.

A number of women have had multiple miscarriages; these women live in or very near the wet places. This woman, for instance, had 2 normal pregnancies resulting in healthy children before moving to the Love Canal. When she moved to Love Canal she had 4 miscarriages in a row; the last miscarriage occurred at 6 months and the child was deformed so the distraught woman decided not to have any more children. This woman had 3 miscarriages; one of the children she managed to have was born with 3 ears, and another has deformed ears.

Within the last month, the Environmental Protection Agency halted the use of herbicide containing dioxin (TCDD) after 8 Oregon women wrote that they had 13 miscarriages among them. Two hundred tons of this banned herbicide are buried in Love Canal and the toxic contaminant dioxin has been found in the leachate migrating from the canal.

The presence of birth defects is another sign of chemical toxicity in the very young. In this map (Figure 6) each blue dot represents a child born with a birth defect. Again clustering occurs with more birth defects in those homes in wet areas as compared to homes in dry areas. This table (Table 2) indicates the percentage of birth defects in the official study by the New York State Department of Health. All these have been verified by physician records. Twelve percent of children born in the wet areas had birth defects compared to 5% of children born in dry homes. My own survey includes more birth defects than the official study by the State of New York. My information indicates that 20% of children born in the wet areas have birth defects compared to about 7% of children in the dry areas. I am currently corresponding with the State over the differences, and I believe the true incidence will lie somewhere between the incidence I have and the incidence that the Health Department has. I do not know whether the rate of birth defects for children in dry areas is higher or comparable to that expected for a normal control population.

Some of the birth defects in this survey were minor or easily corrected by surgery, such as webbed toes, an extra toe or extra or unusually spaced teeth. Others, however, were much more serious including a deaf child, 5 children with mental retardation, 6 with kidney abnormalities, and 3 with heart defects.

Most people believe that the flow of chemicals into the neighborhood has gotten worse in the recent past - perhaps because the drums containing the toxic wastes are rusting through and perhaps because we have had 2 winters of abnormally heavy precipitation. We therefore asked whether there has been a particularly noticeable increase in birth defects among the children born in the last 5 years to women living in wet areas. From 1974-1978, 16 children were born in homes in wet areas; 9 of these children had birth defects (Table 3). This gives an incidence of over 50%, clearly an unacceptable health hazard.

- 11 -

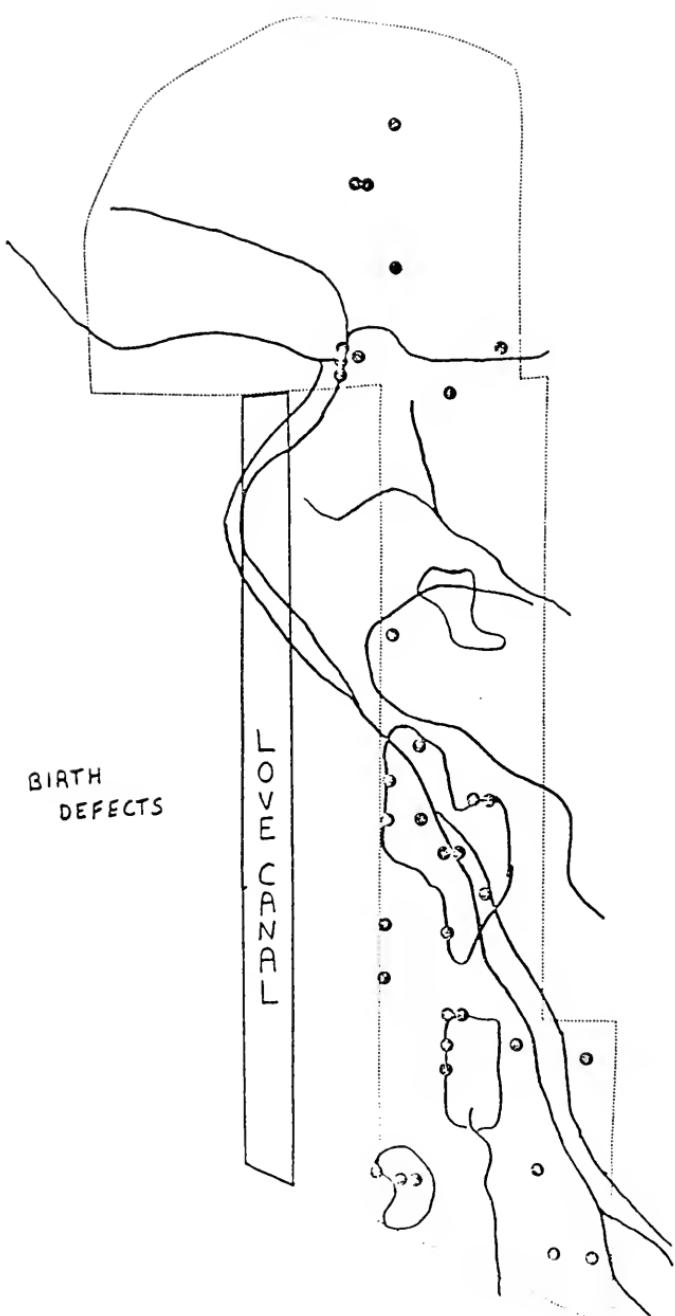


FIGURE 6.

- 12 -

Table 2

BIRTH DEFECTS IN CHILDREN BORN IN LOVE CANAL AREA

	<u>Wet areas</u>	<u>%</u>	<u>Dry areas</u>	<u>%</u>
Number of children born	120		176	
Number with birth defects (New York Health Dept. data)	15	12.5%	9	5.1%
Number with birth defects (residents' data)	24	20.0%	12	6.8%
Relative risk (residents' data)	2.9			
chi square 12; probability that difference is due to chance is less than .001				

Table 3

BIRTH DEFECTS IN CHILDREN BORN DURING LAST 5 YEARS IN WET AREAS

Children born	16
Number with birth defects	9
Percentage	56%

Central Nervous System Toxicity

In addition to causing birth defects, some of the toxic chemicals found in Love Canal are known central nervous system poisons. Lindane is found in the yards and in 75% of the sump pumps of homes in wet areas. Lindane causes hyperirritability and convulsions. Three other central nervous system poisons have been measured in the air of these homes; tetrachloroethylene, chloroform and trichloroethylene.

Central nervous system poisons can produce convulsions, loss of coordination, headaches, insomnia, hyperirritability and psychological depression. There is strong evidence that symptoms of central nervous system poisoning are occurring in the population surrounding the Love Canal. Each dot on this map (Figure 7) represents a nervous breakdown - either a suicide attempt or an admission to a mental hospital. I did not place on this map the many reports of "nervous condition". Most of the nervous breakdowns occurred in homes in wet areas. Those that occurred in dry areas (indicate on map) are very close to wet areas. This table (Table 4) shows that almost 9% of adults living in wet areas have had a nervous breakdown compared to 2.2% of adults living in dry areas in the southern section and 0.7% of adults living in dry areas in the northern section. The risk of an adult in the wet area having a nervous breakdown is 7 times the risk of all adults in dry areas.

Table 4
NERVOUS BREAKDOWNS

	<u>Number of adults</u>	<u>Number of nervous breakdowns</u>	<u>%</u>
Living in wet areas	149	13	8.7%
Living in dry areas- south section	226	5	2.2%
Living in dry areas- north section	284	2	0.7%

Relative risk wet areas to all dry areas: 6.9

chi square wet/dry south 8
probability that difference is due to chance is less than .005

Other Health Effects

Several chemicals in Love Canal are known to be toxic to the kidney and urinary system. This table (Table 5) shows that urinary disease occurs in 7% of persons living in homes in the wet areas as compared to 2.5% for homes in dry areas. These represent a variety of disease

- 14 -

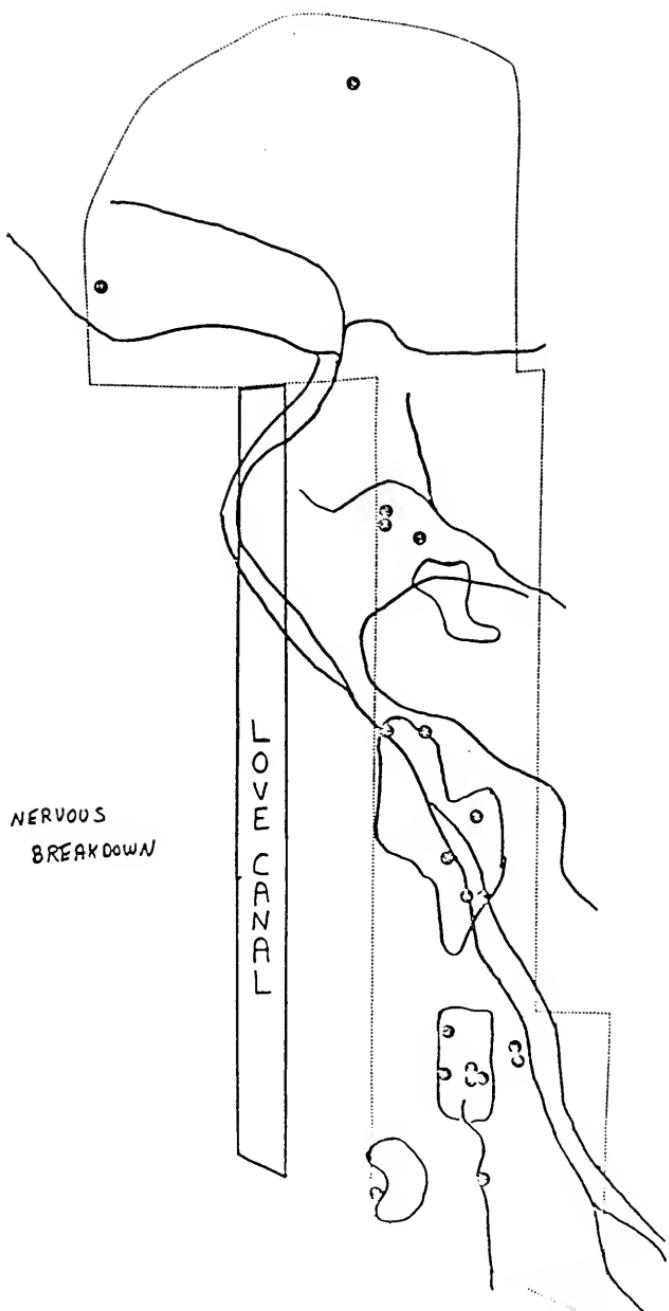


FIGURE 7.

- 15 -

including congenital malformations of the urinary system, loss of kidney function later in life, injured ureters or urethras leading to incontinence and severe, frequent bladder infections. Persons living in wet areas are 2.8 times as likely to have urinary disease as persons in dry areas. This map (Figure 8) shows the clustering of urinary disease in the wet areas.

Table 5
URINARY DISEASE IN LOVE CANAL AREA

	<u>Number of people</u>	<u>Number with disease</u>	<u>%</u>
Living in wet areas	314	22	7.0
Living in dry areas	826	21	2.5
Relative risk	2.8		
chi square 13	probability that difference is due to chance is less than .0005		

Respiratory disease of all types are common in the neighborhood. This table (Table 6) indicates that persons living in wet areas are 3.8 times as likely to have asthma as persons living in dry areas.

Table 6
ASTHMA IN LOVE CANAL AREA

	<u>Number of people</u>	<u>Number with asthma</u>	<u>%</u>
Living in wet areas	314	14	4.4%
Living in dry areas	826	11	1.3%
Relative risk	3.8		
chi square 10	probability that difference is due to chance is less than .005		

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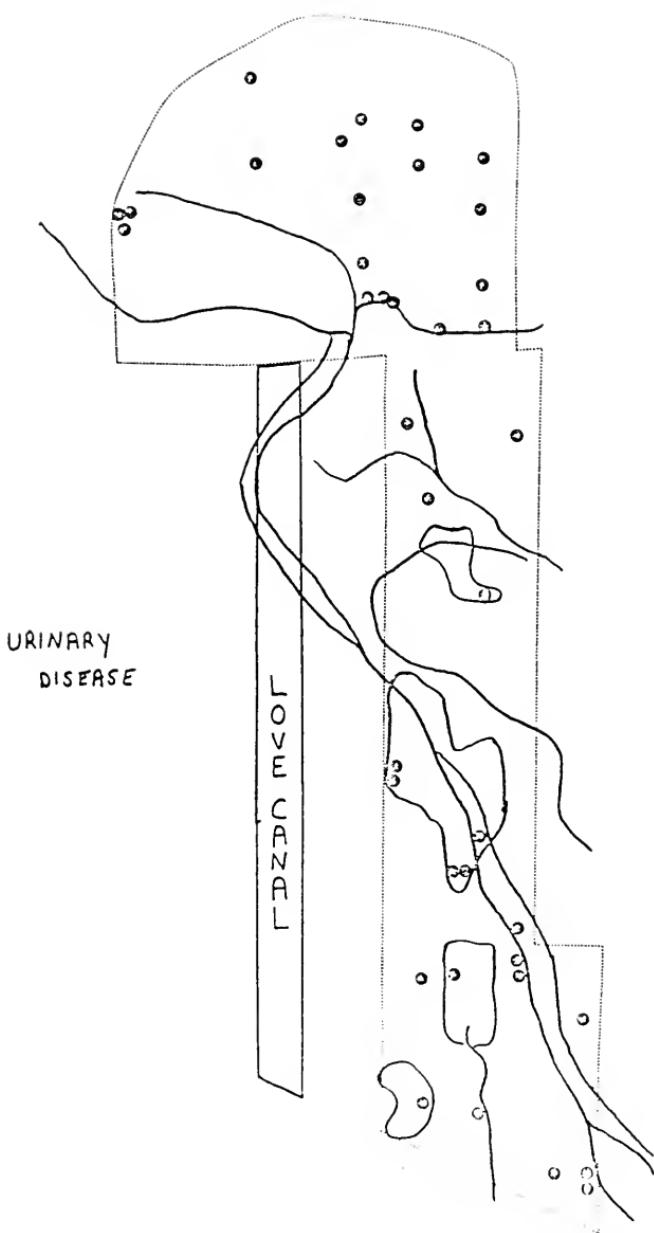


FIGURE 8.

Health Hazards for Which There is Probable Evidence

I would like to turn now to the health hazards that are probably present but for which the data are less certain. If there are central nervous system poisons in the Love Canal neighborhood, then other types of central nervous system effects would be expected. My data indicate that the frequency of suicides, convulsive disorders such as epilepsy, and hyperactivity in children are elevated. However, I have less confidence in these data due to the small number of cases or due to problems in diagnosis.

For instance, over the past 10 years 6 suicides have occurred in the Love Canal area when 1.7 would be expected for a population this size. Five of these 6 could be related to living in a wet area and the 6th may possibly be related. Three of the suicides occurred in people living on the canal, 2 occurred in people living along a stream bed. The 6th suicide occurred in a person who had lived directly along the canal for most of her life but had moved elsewhere in the neighborhood about a year before committing suicide. This increase in suicides is statistically significant; nevertheless a scientist feels uncomfortable working with such small numbers. Other medical studies have shown an increase in suicides in persons exposed to central nervous system poisons.

The data indicate an increased incidence of hyperactivity in children. I feel less confident about hyperactivity because this diagnosis can be misused but I think it is relevant that 11 of the 13 hyperactive children live in wet areas.

I also think it possible that chemicals in the Love Canal neighborhood may be causing convulsive disorders such as epilepsy. Twelve persons with a convulsive disorder live in the neighborhood. These are more likely to live in wet areas (χ^2 square 3, probability that this difference is due to chance is less than 0.1). Of persons living in wet areas, 1.9% have epilepsy compared to 0.7% of persons living in dry areas, a relative risk of 2.7. Indeed one home whose basement air has one of the highest readings of tetrachloroethylene now houses 2 epileptics. This home is in a dry area but is obviously contaminated. It is also striking that most epilepsy has been diagnosed in the last 7 years, even in adults with no prior history of childhood convulsions and no other known medical cause of epilepsy.

Health Effects for Which There is Suggestive Evidence

In addition to these health effects, there are other health problems in the neighborhood that it has not been possible to evaluate statistically. These require further study. One is a very high frequency of skin disease. Second is a strong suggestion that the chemicals these people are exposed to may be interfering with their body's immune response. The residents report an unusual frequency of upper respiratory infections, pneumonia, and ear infections. In fact, several children have suffered some hearing loss due to constant ear infections. Third, there seems to be a definite impairment of the blood clotting system in these people. There are many reports of bleeding problems such as severe and frequent nosebleeds, unexplained uterine bleeding severe enough to require hysterectomy, and gastrointestinal or rectal bleeding for which physicians cannot find a cause. Fourth, chemicals may be

interfering with bone metabolism. Three persons have Paget's disease which is a demineralization of the bone. Other bone problems are not diagnosed at this time. Fifth, several carcinogens are in Love Canal and I suspect that cancer is elevated in the area. Sixth, I believe that heart disease may be elevated in the area.

In this last map (Figure 9) I have superimposed many of the diseases I have talked about including miscarriages, birth defects, nervous breakdowns, hyperactive children, epileptics, and urinary disease. The concentration of disease is very heavy in certain areas. These data have led me to strongly recommend that the 140 families living in wet areas be evacuated immediately.

All of this evidence is statistical. It's important in establishing the magnitude of the problem, but it does not convey the human dimensions of what is involved. For that, I would like to tell you briefly about the history of one house in a wet area. This house is rented and 4 families have lived there during a 15 year period. In family number 1 the wife had a nervous breakdown and a hysterectomy due to uterine bleeding. In family #2, the husband had a nervous breakdown, the wife had a hysterectomy due to uterine cancer, the daughter developed epilepsy and the son asthma. In family #3, the wife had a nervous breakdown and both children suffered from bronchitis. In family #4, who lived there less than 2 years, the wife developed severe headaches after moving into the house. She also had a hysterectomy due to uterine bleeding and a pre-malignant growth.

first

One of the photographs I showed you was of 2 boys playing in a stream bed. I received that photograph recently and asked the residents to find out about the health of those children. The younger, now 25 years of age, had chronic ear and throat problems, skin rashes, and headaches. The older child, now 31, fared much worse. As a child he developed bone and knee tumors and had several operations including complete knee socket replacement, he had gastrointestinal problems which were diagnosed as ulcers at 16 years of age, he has muscular tremors in eye and arms, he has had brain scans to try to diagnosis his "nervous" condition, he has high blood pressure and has been hospitalized with symptoms resembling heart attacks - this problem is not diagnosed at this time.

Health Studies of Evacuees

Epidemiological studies can never prove cause and effect; these studies only show an association of disease with geographical location. To obtain further information on whether these diseases are related to chemicals from Love Canal, we conducted a health survey on the people who lived in rings 1 and 2 and were evacuated from 4 to 6 months earlier. I did not know what to expect since studies of people who have lived through disasters show an increased incidence of disease in the years following the disaster as a result of the stress. In addition, many toxic organic chemicals are stored in the body fat and tend to remain in the body for long periods of time.

As a result of these 2 factors, I did not expect much improvement in health after such a short time. One hundred and 1 families were surveyed. I was surprised to find that 67 reported a major improvement in health since moving (Table 7).

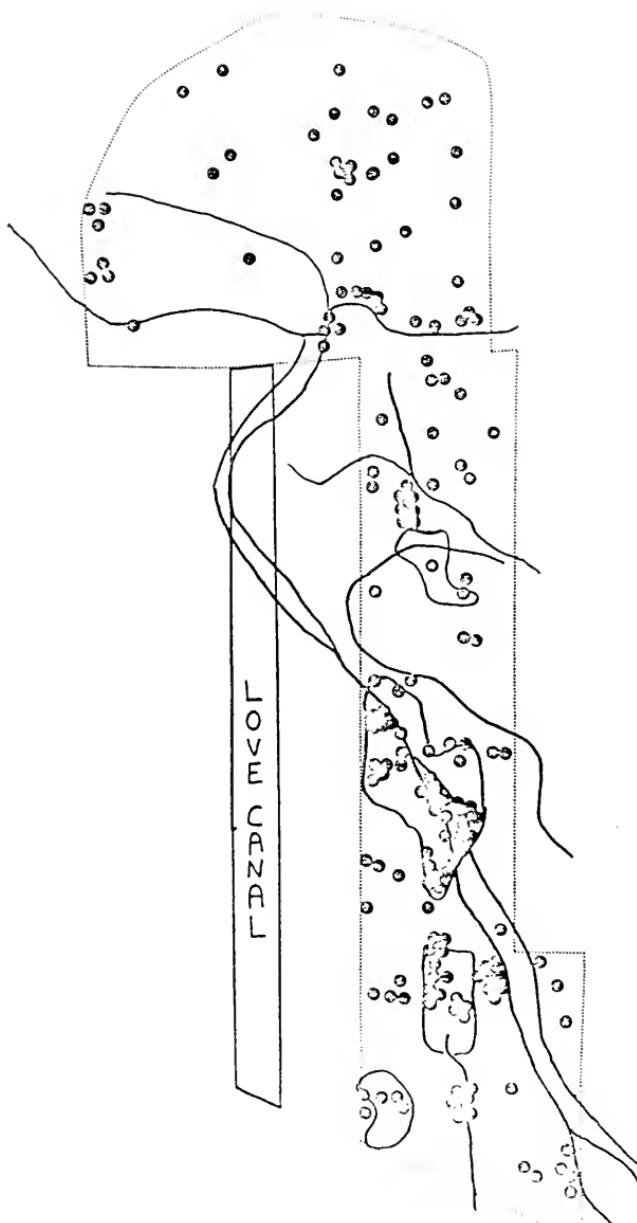


FIGURE 9. Miscarriages, still births, crib deaths, nervous breakdowns, hyperactivity, epilepsy, and urinary disease in Love Canal area.

- 20 -

Table 7
HEALTH STATUS OF 101 EVACUATED FAMILIES

	<u>Number of families reporting</u>
Improved health	67
No change	34
Poorer health	0

Of the 9 families who reported that frequent ear infections were a major problem while living on the canal, all 9 reported a major improvement in this problem. Of the 50 families who reported that colds, pneumonia, bronchitis and sinus infections were a major problem while living on the canal, 49 reported an improvement. Of 12 asthmatics, 11 reported an improvement; some of these have not had a single attack since moving. Of the 17 families who reported skin rashes as a problem, 14 have experienced improvement since moving. Of the 12 families who reported that severe depression or a nervous condition were health problems, 11 have reported major improvements. Of the 39 families that reported migraine or frequent headaches were a problem, 38 have reported a major improvement.

Table 8
HEALTH STATUS OF EVACUATED FAMILIES

<u>Health Problem</u>	<u>Number of Families Responding</u>	
	<u>Improved Health</u>	<u>No Change</u>
Ear infections	9	0
Upper respiratory infections	49	1
Asthma	11	1
Skin rashes	14	3
Depression	11	1
Headaches	38	1

One individual case is illuminating. One child had been extensively studied at Buffalo Children's Hospital for severe growth retardation. At age 3, she had a bone age of 1 year. Her doctors told the parents that they didn't know the cause of the growth retardation but that the child would probably be a midget. Since leaving the canal this child has begun to gain weight and grow rapidly.

I believe that even this limited survey of people who have been evacuated indicates a major improvement in the health problems can be achieved by evacuation despite the stress of loss of home and community.

In contrast, the people who have been left behind, particularly those who live in wet areas, are still facing a serious health hazard which they are powerless to correct without governmental action.

Recommendations

Based on these studies, I have made several recommendations:

(1) The 140 families living in wet areas in the section studied be evacuated immediately.

(2) All women of childbearing age who wish to have more children should be evacuated. They should be advised to wait 6 months to a year before getting pregnant to allow chemicals to be excreted from the body.

(3) Sick people who live in dry areas should be evacuated if they wish to move. There are some homes in dry areas with very high levels of chemical readings in their basement air and there are families in dry areas ill with multiple diseases. We do not know enough about what is occurring underground. Chemicals might be migrating along sewer pipes and service lines. Drums of toxic wastes may be buried in discrete areas separate from the Love Canal, as some truckers have claimed. Toxic wastes have migrated into the storm sewer system and these storm sewers back up and saturate yards with toxic chemicals.

(4) Detailed studies must be initiated on the west side of the canal where I have not done any health studies. A major swale runs through a housing development known as Griffin Manor. It touches 15 apartments. In fact, the entire Griffin Manor area was once low and swampy. It is possible that the area has been heavily contaminated. If it is, more families would have to be evacuated.

(5) The remedial construction work was planned before the importance of the stream beds was understood. It is important to modify the plan. Otherwise it may be that the construction of a drainage ditch parallel to the canal will simply lead to an increased flow of toxic waste down the stream beds.

(6) The stream beds may be so contaminated that they will have to be dug out, contaminated soil on either side removed, and drainage tiles be placed in each one. However, it may be necessary to abandon the entire neighborhood.

(7) Love Canal is as much a disaster as any hurricane, earthquake, or flood. The Federal government has accepted the responsibility of aiding areas hit by natural disasters. In 1977 our area in Western New York suffered a blizzard. Millions of dollars in aid were provided in response to the financial loss and inconvenience involved. Now we have a disaster that involves not only financial loss but also terrible health effects from a catastrophe that was totally beyond the control of the victims. They are trapped in a more serious and long-lasting way than any of us were by the blizzard. Their chemicals won't melt away in springtime. One of the neighborhood residents has expressed it very simply. He said, "I've been through a fire, I've been through a flood, and this is far worse".

STATEMENT
OF
ROBERT F. FLACKE
COMMISSIONER
NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
SENATE COMMITTEE ON
ENVIRONMENTAL AND PUBLIC WORKS

Meeting Room No. 3
Niagara Falls Convention Center
Niagara Falls, New York

May 18, 1979 3:00 p.m.

People throughout our state have, in recent years, learned first hand of the impacts of toxic substances on their lives. Some communities on Long Island have been forced to stop using groundwater contaminated by toxics. Mirex in Lake Ontario, acid rain in the Adirondacks, sludge in the New York Bight and PCBs in the Hudson, have severely damaged profitable commercial and recreational fisheries. Nowhere in the State, however have the impacts of toxic substances been more apparent than here on the Niagara Frontier where Love Canal has become a nationwide symbol of the public health and environmental implications of hazardous waste dumps and has shown us, in the most tragic ways, how people's lives can be affected by these wastes.

Love Canal has also raised several vitally important questions about hazardous waste sites:

- Where are the hazardous waste dumps in the state;
- How serious are the health and environmental problems at these sites;

- 2 -

- What remedial actions should be undertaken to deal with these problems;
- Who should undertake these actions;
- Who should pay for these actions;
- What sorts of facilities should be constructed to deal with wastes now being generated;
- How should construction of such facilities be financed; and
- Should facilities be publicly or privately owned.

Last summer, in the wake of the State Health Department declaration of a health emergency at the Love Canal, the State took a very concrete step toward addressing these questions. In August, DEC announced the establishment of the Interagency Task Force on Hazardous Wastes made up of representatives of the state departments of health and environmental conservation and the Region II office of EPA. This Task Force was charged with responsibility for identifying hazardous waste disposal sites in Erie and Niagara Counties and making recommendations for remedial action, legislation and litigation.

The Task Force is, we believe, the first attempt any place in the country to identify the location and nature of hazardous waste disposal sites in a large geographical area.

The Task Force issued its draft report on April fifth. The key findings of the report are as follows:

-3-

1. The Task Force identified 215 disposal sites, 109 in Erie County and 106 in Niagara County. The location of these 215 sites is indicated on a map inserted in the report.
2. Of the 215 sites, 78 are active, 126 are inactive while the present operating status of 11 sites is unknown.
3. 125 of the 215 sites are owned by private waste generators; 84 sites are or were owned by state agencies, municipalities or private entities or persons; 6 of the sites are located on property presently or formerly owned by the federal government and connected with federal government activities.

The Task Force placed each of the 215 sites in three categories. Priority I sites were those which definitely received large quantities of hazardous wastes. Priority II sites may have received large quantities of hazardous wastes. Priority III sites are unlikely to have received significant quantities of hazardous wastes.

Of the 215 sites, 36 were in Priority I, 116 were in Priority II and 61 were in Priority III. In addition, two sites, SCA in Porter and Newco in Niagara Falls, which have definitely received tremendous quantities of hazardous wastes, were placed in a special category as DEC approved commercial hazardous waste management facilities.

The Task Force Draft Report also includes many specific recommendations for legislation. In particular, the Task Force recommends that

- (a) DEC's and DOH's powers to enter property and test for hazardous wastes be increased;
- (b) DEC report annually to the Governor, Legislature and the public on the location of all hazardous waste sites in the State;
- (c) DEC and DOH be given the power to carry out remedial measures when landowners do not obey summary abatement orders;
- (d) EFC's powers to carry out long term abatement activities should be increased;
- (e) A State fund be established based on State appropriations and taxes on waste disposal sites from which money could be drawn to pay for remedial activities; and
- (f) The federal government play a key role in providing regulatory and financial assistance to State programs on inactive sites.

The Task Force HELD public hearings on the draft report on May 1, 2 and 3 in Niagara Falls and Buffalo. The May 3rd hearing in Niagara Falls was a joint hearing with the State legislative committees on toxics.

Over 75 persons made statements at the hearings. They represented the whole spectrum of persons vitally interested in the hazardous wastes - environmental groups, unions, homeowners, company executives, government officials, university professors, farmers and clergymen. The hearing examiner, Professor William Ginberg of Hofstra University Law School is now compiling a summary of the hearings and his recommendations. The Task Force is concurrently revising its Draft Reprot.

Meanwhile, our Buffalo Regional Office is following-up on the Task Force Draft Report. The Regional Offices has already contacted owners of Priority I sites to determine what efforts such site owners one willing to make to remedy any health or environmental problems at their sites. Surveys of all Priority I and II sites have begun. The Regional Office staff capable of dealing with solid waste problems has been increased.

While the Task Force has been focusing in depth on Erie and Niagara Counties, the Department has been developing ongoing programs to deal with the general toxics problem in the State.

First, I have established an office of toxic substances to develop and implement statewide strategies for the control of toxic substances. This office, under the direction of Thomas Quinn, has already initiated a statewide

identification program for hazardous waste disposal sites and contaminated groundwater and lake and river sediments. To date, nearly 500 sites have been identified.

The office is also making a major effort to define the management and control measures necessary to protect the health and environment from hazards posed by inactive dumps, the cost of such measures and the legal tools necessary to effect them.

The report on State strategies will be published shortly. The strategy will include the following elements:

1. Setting inspection priorities for all of the disposal sites identified in the report based on known or potential health and environmental effects;
2. Conducting field inspections and gathering information for each identified site in order of priorities. For example, inspections will involve interdisciplinary teams of health and environmental specialists (e.g., biologists, hydrologists, geologists, engineers and chemists);
3. Sampling, monitoring and analysis of air, water, soils, wastes, vegetation and animals based on needs identified in the inspections;
4. Proposing and initiating remedial actions. This may involve, in simpler cases, merely posting,

limiting access, fencing or covering or removal of wastes. In more complicated cases, remedial action may include site dewatering, leachate collection and treatment, complete excavation and treatment and/or disposal elsewhere;

5. Making a conscientious effort to keep the public informed, to provide local officials with advice and assistance, and to seek public participation in finding solutions to the problems.

Of specialists who will undertake whatever immediate action is necessary at sites where there is an imminent threat to health or the environment, my Department and the State Health Department have established emergency response teams.

The report will discuss a number of important issues. Many require decisions effecting public policy and commitment of resources to solve problems of past and future disposal of toxic substances. Beyond the systematic investigation of in-place toxic problems identified above, there will be recommendations concerning:

1. Development of technology for the destruction or detoxification of toxic substances through incentives for a private toxics disposal industry.
2. Control of toxic substances to prevent problems for future generations.

3. A thorough study of groundwater now affected by toxic substances.
4. Control of septic tank cleaners and other products containing toxic substances which pollute groundwater.
5. Control of storage tanks for gasoline or other toxic substances to prevent leakage to the environment.
6. Establishing responsibilities for funding investigative and remedial construction work to be paid by private industry and various levels of government.

The second aspect of DEC's ongoing work centers on our Bureau of Hazardous Wastes in Albany. Under the direction of Charles Goddard, the bureau coordinates the hazardous waste work of the regions, registers industrial waste haulers under Part 364 of our regulations, reviews design plans and applications for secure landburial facilities and prepares rules and regulations for control of hazardous wastes.

The Department's hazardous waste program predates the passage of the federal Resource Conservation and Recovery Act of 1976 ("RCRA"). However, last year our program was given new impetus when the state legislature passed the Industrial Hazardous Waste Management Act. This new law is patterned closely after RCRA and is fully expected to satisfy RCRA standards for authorization of state programs. It provides for the identification and listing of hazardous wastes; a manifest system for monitoring the transportation,

storage and disposal of hazardous wastes; standards and permit procedures for approval of hazardous waste generators, transporters and owners and operators of treatment, storage and disposal facilities; inspections of facilities and long term maintenance of storage and disposal sites.

The state statute is, in large measure, specifically keyed to the issuance by EPA of regulations on hazardous waste identification, the manifest system and requirements for long term maintenance and monitoring of sites. Until those regulations are issued, our state law is, for the most part, a dead letter.

My Department has serious concerns about the regulations that EPA proposed in December. Specifically, we question (a) the exemption for wastes based on quantity or ultimate destination; (b) the use of incomplete lists of toxic materials as the basis of regulation; (c) the limitation of the long term care responsibility to only 20 years; and (d) the effectiveness of the proposed manifest system.

My Department submitted detailed written comments to EPA in April. I would be happy to make these comments and our earlier testimony available to you.

The federal government has an important role to play in the management and control of inactive hazardous waste disposal sites. I feel strongly that the nation, as a whole, has benefitted from the chemical technology that

-10-

industrialized states like New York have developed. The nation, as a whole, should, therefore, share in the cost of the programs to assure protection of public health and the environment from problems created by toxics.

First, it is absolutely essential that EPA issue final regulations quickly and in a form that will ensure effective management of hazardous wastes. While our hazardous waste management has functioned to date independently of RCRA, we need the full pressure of a manifest system to ensure that the hazardous wastes we are generating today do not create the Love Canals of tomorrow.

Second, there should be specific federal standards for state programs dealing with inactive sites. States with programs meeting those standards should be entitled to federal financial aid. If a state program does not satisfy the federal standards, the federal government should carry out its own program in that state and the delinquent state should be penalized in some manner. This will help to insure that the problem of inactive sites is addressed everywhere in the country and that states, like New York, with aggressive programs to deal with the problem are not adversely affected by the loss of industry to states that are more lax.

Third, there should be a high level of federal funding for state programs to control toxics problems like abandoned

-11-

dumps and toxic sediments in the Hudson and Lake Ontario. Toxics posing health and environmental problems are located across the country. In recognition of the broad scope of the problem and the inability of states to fund statewide clean-up and remedial programs, the federal government should bear a large share of the burden of financing such programs. In addition, the federal government should increase current funding for ongoing state regulatory programs.

Fourth, the federal government should raise some part of the money for assisting state programs by imposing fees on generators, haulers or disposal site operators across the country. These fees can only be imposed nationally because fees imposed by one state will only encourage the movement of wastes (and industry, in general) out of that state.

Fifth, the federal government should encourage new technology. Incineration, biodegradation, chemical decomposition/detoxification and solidification are among the long term solutions to the hazardous waste problem. The federal government should encourage the development of these technologies as a substitute for land disposal, through grants, tax incentives, technical assistance, and other means.

Sixth and finally, the federal government should provide a substantial amount of emergency assistance to

-12-

states, in addition to financial aid for ongoing programs, when emergency situations, like the Love Canal, arise.

This expanded federal commitment together with the state program I have described will ensure that the health and environment of the people of New York will be protected.

I commend you for holding these hearings and thank you for inviting me to participate in them.

Senate Subcommittee on Toxic Substance & Chemical Wastes

Deborah Cerrillo

Vice-President of the Love Canal Homeowners Association

May 1, 1979

Good afternoon, I am Deborah Cerrillo a former resident of the Love Canal Tragedy.

I would like to tell you of my feelings on the present local, state and federal response to Hazardous Waste Emergencies.

First of all I would like to tell you of my involvement with the Love Canal. I lived there for approximately 9 years. I was drawn to the area because of its location and nearness to schools and shopping centers. Also the realtor who sold me the home and had no mention of a chemical waste dumpsite. If proper mention of the dump by local Municipalities was given, surely no one would have moved in the area. They knew of the dump but they allowed residents to build 30 feet on the edge of the canal. Knowing full well the clay cap was disturbed back in 1953 when the school was built. And also knowing it was at that time injuring children as far back as 1954. Local officials were told of the mishap and chose to ignore it completely. Also they had to know the severity of the problem when they began building the school and had to stop and vote on moving the school over 60 feet because of noxious fumes and chemicals surfacing and jeopardizing the health of the construction workers who were building the school. Complaints on this matter were continually brought to the attention of our City Fathers about children burning their hands and feet. For Example: Dogs and cats dieing of unknown causes.

The inadequacy of a Health Department in not telling the residents of the Love Canal and the severity of the problem. In 1976, Calspan was brought in to do a study to follow up the complaints of the residents to the city. Our Dear Mayor was given the results of their studies at which time absolutely nothing was done. The results of their study were appauling. Eleven known animal carcinogens and two human cancer

causing chemicals. Absolutely nothing was done as far as a resident citizen could see or hear about.

Until there was citizen pressure group formed, I don't believe anything would have been done until much later. City officials fought us all the way. First they wouldn't consider it a health hazard. A child with increasingly worse health problems going to that school they said its not proven so its out of the question of removing a child from a school knowing full well it was built on a chemical dump.

Then when Lois Gibbs and myself went to Albany on August 2nd bearing 160 signatures backing our plea to close the school. We had no input in a meeting deciding on our lives. Apparently Commissioner Whelan had done a little homework the evening before and made an order for Women who were pregnant or had a child under the age of two be immediately removed from the area. And also they planned to close the school putting a snow fence around it to prevent children from playing upon the playground which was the center of the Canal. One good thing they never opened the school again. I feel the City of Niagara Falls, the Mayor and Health Officials played down a major tragedy. As for the State, I believe they did a decent job of stepping in and overseeing the works of Niagara County.

The first blood testing was taken the first of June. Of course, I was fourth in line so I personally didn't have to stand in 90 degree weather for hours to have my test done and finding they ran out of needles when I had gotten to the front later finding that my blood was spoiled from its standing around in the heat. Many residents became anxious and suffered heat exhaustion by standing outside a truck for testing.

I believe appointments for certain hours for testing could have been in order. They also handed me a 22 page health survey that covered most every part of my body with the exception of my children. Thats right. No survey was provided for each child. They said use the other side, if we had any medical information to offer on our children. They said adults were most important at that time. No

- 3 -

personal contacts were made for the residents to explain the contents of the questionnaire. Some residents were not able to understand the surveys. Or frightened enough not to share their private information with them. Some type of reassurance should have been in order as to not alarm them. The Homeowners Association did a personal one to one survey for Dr. Paigen and I'm sure with more of a personal basis we got more results. I've been bounced from pillar to post through all this. First told go to the Health Department which in turn they told us to go to the Department of Transportation or refer you to your physician and so on. It was very confusing to be shuffled in the multitudes.

Then dealing with State Officials, we finally got recognized as a united group of homes they agreed to meet with the elected officials of our Association. I myself being Vice President, of the Homeowners Association, I've been in those closed door working meetings. We discuss a particular matter and come to a final decision and when the doors are opened to the public and the press. They turn the story around and give a release of being unreasonable and say we come to no conclusion.

Most of our needs have been met. First the closing of the school, then the first ring of homes a week later, ring 2 of homes then a 7 month stalemate. February 8th the decision of outside Ring 1 and 2 of pregnant women and children under 2 be removed. They removed our indicator. Just like the canary removed from the Coal Mines. Now the indicator (the fetus) can not indicate the severity of the problem lesser stage. No more to be removed. Stay there and suffer the ill affects of exposure to toxic chemicals. They say we can't connect the illness to the chemical exposure. We have mapped it out with the New York State Health Department swale theory and our overlay maps of the health problems cluster on their swales. More and more studies have to be done "says the state"!!! Use them as a demonstration projects. Or guinea pig. We are humans. I believe they have forgotten that fact.

-4-

I tell you of the inadequacy of the state. They took care of me. I'm from the first ring homes, but they have failed to address the problems of my friends and neighbors left behind.

The problem is that city officials, commissioners and doctors from the so called "Blue Ribbon Panel" and the Governor do not see this for what it really is a chemical disaster. People should not have to pay for the polluters profit. The fault should lie with the polluters, make them pay. We have to turn to the state for immediate help, who can then re-coup the money loss through law suits.

First should come the citizens and their health. Second should be who will pay. Human lives can not be used as guinea pigs, until such time that beyond a shadow of a doubt they should be removed from a chemically contaminated area.

They readings the New York State Health Department took, I hold as useless. Why? Because my reading was less than one or undetectable. Well, about three weeks ago they got the Dioxin soil samples from my front and back yards showing 20 parts per billion, how could this be possible when my air reading showed zero. The air readings were only checked for seven chemicals, and at last count there was 207 chemicals listed as buried there.

As for the Federal Government they have proposed 4 million dollars for clean-up and clean up only, not for the removal of more people from the contaminated area. The Federal Government has a moral obligation to step in and evacuate people from the west side of 93rd to the east side 103rd street, Bergholtz Creek to Buffalo Avenue. Human lives are at stake. Government at all levels MUST put this disaster as their first priority. Thank you for your time.

JAMES L. CLARK TESTIMONY BEFORE SENATE COMMITTEE ON
RESOURCE PROTECTION & ENVIRONMENT & PUBLIC WORKS

GENTLEMEN:

My name is James L. Clark. I am a disabled American Veteran having served approximately 14 years in various paratroop, Green Beret and Guard Units.

I have lived over eight years in the Love Canal area. Since living there my family has suffered many serious health problems.

The adverse health affects in that area are real. These people need to be immediately evacuated from that contaminated area!!!

Dr. Beverly Paigan's findings in many cases substantiated by surgery.¹

The New York State Health Department's attempt to disprove the illnesses seems to be working against the purpose of a health department.

With all the contaminants² found, one can only assume that there is a definite risk to the population of the Love Canal area.

We had another suicide discovered this past Friday.³ A 22 year old male shot himself. No one knows why; nor will they know why the next one will do it. This is a fact of life we live with every day.

New York State Health Commissioner, Dr. David Axelrod's statement before the Congressional Subcommittee that: "The cancer data could not be substantiated", is absolutely ludicrous. New York State Law requires that all cancer and tumors be reported to the New York State Health Department.

Besides our area has one of the finest cancer research institutes in the world - Roswell Park Memorial Institute in Buffalo -- and New York City has Sloane Kettering Institute. Why can't cancer findings be substantiated?

The "Blue Ribbon Panel" that was secretly assembled to look into the health problems - and no names revealed to the public - was an absolute insult to our intelligence. I wrote Dr. David Axelrod advising him of the New York State Law-on Freedom of Information, Sec. 84-90.⁴

When a panel rules on a matter affecting the health and lives of my family, I would like to know who they are, if they are qualified individuals who can tell what is wrong and what course of action is to be taken to alleviate any problems. I have received no answer!

In the first two rows of houses, the people were removed without any scientific investigation, solely on a political campaign promise. When the human cry went up from the people, the Governor them promised on national T.V.: Allow us to move these two streets and anyone with health problems or chemicals also will be removed.

Approximately 23 families submitted their health records (under a short time limit). Our answer back was this enclosed form telegram - even people with heart conditions for it, but were afraid to open it. Three days later we received a certified letter saying the same thing.

Gentlemen! The evidence is in. The chemicals have leached. The health problems are real. These people must be relocated.

You do not solve a problem of this magnitude by arbitrarily drawing a line on a map, putting up a fence, at our expense, and have the Governor say: "That is all the houses we are going to buy".

Only now are the doing hydrology studies in the outer area. They have drilled 18 holes and 12 are contaminated⁵, and the people are telling them that they are drilling in the wrong places.

This document from the State tells of the fact that the ambient air is the Love Canal area is infested with chlorinated hydrocarbons 80 times greater than in downtown Niagara Falls, which isn't too sweet.

The New York State Health Commissioner at every meeting simply states there is a risk of flying in an airplane, that there is a risk in crossing a street. We want to know what the risk is of living in an environment with known human carcinogens where the quantities are 80 times greater than in the downtown air of an industrial city (Niagara Falls).

We know the affects of dioxin.⁶ These are the only statements that we have on Dioxin that we received from the Health Department.

Hooker's role in this entire affair has been to launch a massive advertising campaign - in essence claiming that the victims caused the problem by moving into the area and disturbing the clay cap.

The Love Canal dump, according to Hooker, was done in the most scientific, expertise manner of the times -"a secure landfill"- meeting all the requirements of a secure landfill: isolation, barrier, sealed vault, clay cap, etc. All of this is readily disputed by this 1952 photo showing it leaching into the river.

Why wasn't it corrected then? Why are we using approximately the same technique now? It did not work then and it will not work now nor ten years from now by the State's own admission.⁸

The whole remedial plan - their 6 inch pipe - is only an engineering hypothesis which has yet to be proven.

The chemicals that have and are leaching from the Canal are not going to be brought back into the Canal. The people are, and will be continually exposed to, dangerous toxic chemicals.

This remedial plan was drawn up between City, State, Hooker, and an engineering firm which happens to be a Hooker business associate. The construction work for this plan was awarded, without bid, to another Hooker business associate - The Newco Chemical Corporation. Our City Manager, who awarded the contract for the construction work, resigned and moved to Florida to work for Newco.

If the construction work had been implemented all at once, instead of in three phases there might have been the possibility of containing some of the chemicals. Just the other day, north of the completed construction site, this fact was clearly shown by chemicals leaching from the ground, running into the storm sewers, and into the Niagara River for three days. After news coverage, the remedial construction crew instigated emergency procedures. "Emergency Procedures" because the insurance policy did not cover this - an insurance policy that New York State paid 1.3 million dollars for to cover approximately 40 workers.

In the next three days, over 12,000 gallons of leachate were sucked up. I wonder how much they did not contain from going into the river.

With hundreds of chemicals, of dioxin, of radiation, how much longer will these people be forced to stay?

Niagara Falls itself is a scenic wonder. Why are they allowing to to be turned into a chemical dump?

Newco, while doing the remedial work at the 16.5 acre Love Canal, is building a potential 400 acre Love Canal on 56th Street. Another "secure landfill"??

And S.C.A. is building a 900 acre site below the Falls that affect our friends to the north in Canada. S.C.A. has permission from the Department of Environmental Conservation to dump up to three million gallons per day of so-called treated waste into the Niagara River starting in late March 1979. Presently that are dumping "only" 550,000 gallons.

There is no such thing as a secure landfill. While being the greatest industrial nation in the world, we are using antiquated methods of waste disposal and of regulating it. What we are actually doing is regulating the slow, systematic poisoning of our citizens.

The people want this dumping to stop. We have letters from unions and religious leaders to this effect.

The technology for a total, safe method of waste treatment exists. We must initiate a national program on ~~the~~ mandatory industrial high temperature incineration of toxic wastes.

But this solution cannot be left to private industry. It has been proven time and time again that industry will not police its own garbage even though laws and regulations exist. I know it is not by design or intention, but a situation could exist where a company that pollutes forms another company to clean up the pollution at the taxpayer's expense.

A national program would be expensive, but we cannot afford not to start it. What is one child's worth? What is the next Love Canal worth? We cannot victimize our Nation's children through carelessness and greed.

The Niagara Frontier will be a perfect place to initiate a pilot program with over fifty chemical dumps identified and more being built.

Thought must be given to the identification, registration and exchange of waste among industries because one industry's waste is another industry's raw material. Recycling, reclaiming and detoxifying these wastes would help the energy crisis. Even electricity could be generated from the steam created by the high temperature incineration.

Consideration must be given to the transportation of chemicals to be incinerated. Something such as MS-5 could be added to them (it would turn the wastes to jelly) to prevent spillage. If an accident occurred during transportation, at least people surviving the accident will not be splashed with acid.

This would open up a whole new area of environmental studies where the cause and effect of waste-induced environmental problems and the use of industrial by-products could be explored. And more exploration could be done in the area of solar furnaces for incineration, and for high-energy ceramic magnets for detoxification. Without such a program, we will continue to have one Love Canal after another with its disease, its birth defects, and jeopardy of the next generation.

Gentlemen, to show what the Love Canal really means, a little girl in the neighborhood asked me to show you this photo. Her condition came about when the "remedial" digging started and it has grown steadily worse. Several doctors have said it is definitely not teenage acne. Last Friday she was taken to Roswell Park Memorial Institute. They did not know what is causing the severe rash. That girl, Gentlemen, is my daughter.

Gentlemen,

My name is Patricia Grenzy. I am 36 years old and the mother of three beautiful children. Danielle three and a half, Angela two and Matthew six weeks. That is why I am here to speak, tonight. To express my feelings on the Federal and State governments efforts to deal with inactive sites.

A great injustice has been done to a number of lawabiding decent, taxpaying Americans. My experiences over the past nine months are just some of the many sad perdicaments the People of "Love Canal" have been forced to endure.

July 1976, my Husband, Ernest and I Purchased our present home, 793 100th Street, Niagara Falls, New York. It was our first home, just right in size for our family of three. Our stepping stone for our future. However what we hadn't known at time, was our second daughter was on her way. Consequently the following year we decided to sell our house for a larger one. We hadn't any luck and so as of April 1978, we decided to stay and build on two new rooms.

My Husband drew up the plans and so we began. First we bought a pool for our enjoyment. Because our yard was continually flooded it was necessary to add Thirteen yards of dirt before installing the pool.

While digging, the soil reeked of odor, we later,

found to be the same as that of the canal's excavation. I had also frequently smelled it in the air, as the wind blows in direct line of our home from the canal. And what's more the bulldozers we used sunk in our yard in the exact same manner as the bulldozers in the canal sunk, according to a member of Econ. Not yet realizing what was happening around us, we spent the first half of our summer improving our home. Our hard work all spent in vain.

Also in June, I brought the girls to our pediatrician, who is an allergy specialist, in fear of their having allergies. Ernie and I both have them and the girls showed definite signs as well. We were told they were too young to properly test. Yet they continued to have symptoms, itchy red swollen runny eyes and sneezing. This year they are a little older and ask "mommy when will it stop?" Now my newborn also is wheezing and congested and I fear for his health as well. I wrote to the Department of Health, Education and Welfare. Their letter said quote: "With your family's allergy problems you are wise to be concerned."

The girls also acquired sores in their mouths in early summer, I assumed it was from putting dirt in their mouths, as so many children do. But then noted everyone's dirt is chemically contaminated! Also I would like to state both children experienced frequent ear and throat infections with fevers of 104° and 105°. Danielle's starting in July 1976.

The month we moved in. This gentlemen, all happened before we ever heard of Love Canal!

On August first, Lois Gibbs approached me with a petition to close 99th Street School, because of health problems believed to be caused by or irritated by the chemicals in the canal. We talked, she was very informative and I signed the petition.

Still not aware of the extent of the dangers, we talked again of selling our home. The following evening we attended a street meeting which was very emotional and frightening. You see, at this time I suspected to be once again pregnant. On the third day my suspicions were confirmed. That night we attend the first meeting with the State. I stood, informing them I lived just one street away and was pregnant. They had already recommended pregnant women and children two and under evacuation on 97th and 99th Streets. Dr. Herdman told me after the other residents of those two streets were taken care of I would be too. He said I had reason to be concerned!

Every day thereafter I attended the school to enquire what was to happen to my family. Only to receive remarks such as "I don't know any more than you do Mrs. Grenzy" "Only what we read in the papers" when quoting the papers they said "I don't know where they got that from" "It's

just not true." "I can't answer you!" "go see em sonso" The beginning of constant contradictions and run arounds. And what do you suppose they did for me? They put up a fence right in front of my house, to keep out the chemicals, you know. We were continuously assured this wouldn't set up the perimeter. However even now no homes have been purchased beyond those two streets, despite proven contamination! And yet the thousands of dollars wasted on their stupid fence and bases and salaries and lodging of State officials, could have bought all our homes. And how they want to put up another fence to waste more tax money.

On August twenty-fifth we were informed that the United Way was to put us up in a Hotel for ten days, at which time the State was to have investigated our situation. That ten days turned out to be seven long weeks. In that time we, and two other family's put up, underwent most severe anxieties and inconveniences. As we were told it would be just a few more days, nearly everyday. It seemed an eternity and was not an easy or happy experience. On October twelfth we received, along with eighteen other family's, a telegram informing us the State would not temporarily relocate us. The contents of each was exactly the same, only names were different. Proving to us that

individual cases were not investigated as such. All health records were in Albany for their examining. All had letters from Doctors to be relocated. Yet their decision was based on the remedial work and not health problems! We then moved from my Parents, to Friends and finally to my in-laws for what extended to four weeks. During this time pressures built and ill feelings emerged. Along with the other emotional strains we already had to handle, it became too great for us and the children. We felt that if we were to loose all else we couldn't loose our relations with our family and friends as well.

Before moving home we tried every channel we could to prevent returning. From banks to politicians. We even considered leaving our house go, losing all investments, we were however informed we might still be responsible for the mortgage, even if the house were repossessed.

Before I go any further I'd like to state that in the meantime we begged the State to test our Back yard, as it was still flooded, even after being filled to prevent it. We now know our house sits on a wet spot or swale. We also had an air test done in our house for a second time. Dr. Kim said it would probably return higher because of the house being closed up. Yet it returned lower. When I confronted Dr. Kim, he said he didn't understand it and

there was a lot he didn't understand going on here.

Our blood tests returned after three long months, thankfully alright. We were however, informed we should have our children blood tested every year. We will worry of things such as; leukemia, cancer, lung damage, allergies, asthma, liver and kidney disorders, epilepsy, nervous breakdowns, heart problems and genetic problems until our children are grown and then some. That's not a pleasant future of fears to have to face!

After returning home, Dioxin was discovered in the canal, we were told it was nothing to worry about, by the State, at Fourteen parts per trillion. Then at twenty parts per Billion the State still says not to worry. The fact is it takes very little Dioxin to hurt or kill humans.

Still with no satisfaction from the State and absolutely no help from the Federal Government, we began to picket the remedial work. It's December now, very cold and I am six months along. On December thirteenth I am arrested for not allowing a truck to enter the canal. I was picketing in hopes of letting our government know we wanted out to save our children. And to prevent further tracking of chemicals on the trucks throughout the city.

As they were not following safety regulations.
Now, before anyone makes any judgements
on what I have done, please remember even a
mother Bear will do anything to protect her cub and
so any good mother would have done the same!
Perhaps your own wives or mothers! also keep in
mind this is the International year of the Children
for they are what's most important! They are our future!

In January I and other neighbors picketed
in front of the Health Department office in Buffalo
where Dr. Axelrod was to attend. We met with him
and he tried to reassure us we were safe. He told me
that I and my unborn child were at minimal risk.
Not four weeks later he recommended Pregnant
women and children under two temporary
evacuation. Discriminating children over two's Health
what makes a child of two and a half often or sixteen
any less precious? Surely if it's unsafe for
a fetus or two year old, it is unsafe for any age.
In all this time, with all our protests; including
one in front of President Carter and Governor Carey in Buffalo
last November, all our letters, some not answered, some
returned, some handed to some one else to answer.
all our pleading and begging and demanding to be
removed from this tragic disaster, we have

gained no satisfaction. Complete evacuation
is the only answer to our problems.

Even with temporary evacuation, many mistakes
arise. My landlord, for instance, has not received
any rent, we have not received our moving
cost either. We have been there since March
first. Our house has been boarded up, a job
poorly done, unlike the homes they bought. Why
must we endure these added frustrations? They
tell me this is bureaucracy, I call it Stupidity!

The emotional stress I have carried with me
for nine months are now taking its tolls. I have
been experiencing very frightening dreams, all resulting
in the deaths of my children. And my three year old
talks of death continually, even in her sleep. This is
very disturbing to us. I have been told by a counselor
that it all results from the fears of the canal. We
are expected to take our precious three children
back to a contaminated home and area in two years!
I just can't do that, knowing the risks and dangers.
Could you? What are we to do? When can we
establish a normal, happy, healthy home life. To have
a little peace of mind! Living like gypsies has
definitely left its scars on my family what does
the future hold for my babies? Other babies?

And so in closing, if I appear a little bitter, It's because I am a lot bitter! Bitter, because my government; one which is so powerful and great to achieve peace in other countries, help needy people across seas, bring home dead bodies from South America, ect. Hasn't the time nor money to help its own people, when we need it. After all charity does start at home! And it is our tax money! Bitter because our government continues to allow big industries to destroy our environment and control our lives. Bitter because Doctors and Politicians working for the State have forgotten who they really work for "The People", and have put a price on our bodies; used us as guineas pigs!

And our local government has hid their heads in the sand and neglected their responsibilities in this matter. Caring more about a city's image rather than the people who live in it! After all ^{the C'ty} ~~they~~ was responsible for a school and homes being built to begin with. Only the residents forced to live this hell can truly know the anguish I have expressed to you tonight. But I beg you to try and put yourselves in our shoes. How would you feel if it.

were your children with such health problems and bleak futures? or your pregnant wife facing for your unborn child's life? or your parents who have worked all their lives to retire and can't sell their homes to be free to leave?

And then of course all your life's savings being thrown out and lost forever, all your dreams destroyed!

Is this the American way? We have the right to good health! we have the right to pursuit of Happiness!

Please, please don't be among those responsible for our children and us to sit here and slowly die!

Thank you

to Point out
that we the people
may 3, 1979
Gentlemen:

I would like to give you my personal experiences that happened at the Love Canal.

At one of the very first meetings I went to I attended out of curiosity, not knowing at that time our small community would make history.

My husband, myself and our first child lived there over two and one half years. We conceived our second child there in ^{February} ~~March~~ of 1978.

The first meeting I went to was a ~~very~~ briefing of the cleanup work to be done. At this time the county, state & federal govt was not really sure of what was buried there but they did say they would try and clean it up.

I listened ~~of~~^{to} experts speak on how they were going to dig and trench and make it safe and reopen the school, little did they know that they would uncover a timebomb.

The state health dept came door to door passing out health surveys but did not explain some of the questions to us or really tell us what they were for...

The next day I went to the school to ask questions and find out about blood tests to be done on area residents.

I walked in and being pregnant a girl walked up to me to meet Dr. Lianna. She or the girl asked me if I was going to breastfeed my child and I said I was not sure but I was thinking about it they recommended ~~me~~ me not to.

At that time I knew that my family was in a dangerous situation.

I stood in line about one hour to have a blood test done they took five vials of blood and said they would send the results to my doctor. After a lengthy wait of about 7 weeks my doctor got the results. One of the liver function test was elevated and some of the other vials spoiled. So my doctor recommended me to go to a hospital lab. and have the tests redone. These liver function tests were elevated even more, I was (at) concerned because if these chemicals affected my body what about my unborn. At that time I called the State Health Dept. in Albany asking if there was a test or anything that could be done to check my unborn child.

The answer was a simple no. I asked my doctor the same question again no. No test is known to check the toxic effects on an unborn child.

At another time the State Health Dept. had another meeting, at this meeting I asked Dr. Vienna if my unborn child would have a blood test after the birth. his response was "It would be ~~your~~ responsibility."

my husband had his blood taken and the results were lost. He then went again for blood test and after many pressuring phone calls we finally got the results.

I feel the State health dept. did there job very irresponsably and unhuman. They could of saved the State lots of money if we could have gone to private hospitals for the blood tests.

Not only would they have saved money but the tests would have been more accurate and the blood might not have spoiled.

On Aug. 2 1978 the state health commissioner advised small children and pregnant women to move from the area. I was reading the newspaper when I found out about this recommendation. The health dept. notified the families the night before except they forgot to call my family. I really was scared and terribly upset. But within a few days we were living in a motel room. The state then helped us relocate to temporary housing. They said they would pay the rent for up to six months or until we found a new home.

I feel that the state, county or federal govt. should have set up a center to answer residents questions on the ill-effects of chemicals and including emotional stress on our families. I also feel that you as elected officials should put human life ahead of money. Because the people outside of the fence are in the same situation that my family was in Aug. of 1978. Money should not be the main point of the discussion we should value life without dollar signs.

I would also like to add that I gave birth to a child in October. And yes she was born with a birth defect and now is another statistic of the Love Canal.

{ Taxpayers should not be burdened with the cost. We deserve a health plan medically for our children}

SCOTT M. HALE
3331 WALLACE DR.
GRAND ISLAND, NE 68801
Formerly of 1643 99th
Bender Falls, NY

My name is Anne Hillis. I am a Wife, a Mother, I live in Niagara Falls, New York. I also live close to a "Dump". A dump called Love Canal. I don't want to live there anymore. I hate Love Canal, I hate my life at Love Canal. It's a strange life that I lead now, it is filled with disruptions, frustrations, sleepless nights and a grip of fear that only those in similar situations can understand.

My family and I live on a historically wet area, east of Love Canal.

From State, air testing my home, like most homes, shows chemical contamination.

Homes along the Canal edge are empty - a green fence surrounds them now. The fence is far too late, because the contaminated water has been running in our homes (cellars) and yards for years.

We've lived in the home for 13½ years. We lost a child there. My 10 year old son went to 99th Street school, as did other children in the neighborhood, some of those children are gone now after the August, 1978 emergency was declared by Dr. Whalen (New York State Health Commissioner at that time) and President Carter.

But the remaining children are still in the same houses, the same bad air, and the same horrible environment.

Despair, hopelessness, we ask - What are we doing to our children and to our own bodies, staying? The stress alone is enough to break anyone.

I think many of us are at this point. Our homes are valueless, we can't sell, who would buy a home like this?

Some have thoughts of trying to rent, but how can we rent a contaminated house. A house we ourselves fear to live in -- no I cannot.

I want to tell you about my son. As I said before, he's 10, he's a bright boy, he has a 91 average in school, as a baby he never required much sleep, he was put on a sedative at about age 7 months to about 18 months, he developed rashes, frequent bouts of diarrhea and respiratory problems -- always respiratory problems.

His first year at 99th Street school, Kindergarten, he was admitted to the hospital - very ill. The diagnosis - acute gastroenteritis - cause unknown.

After that - more respiratory infections - tonsilitis. At age 6 the tonsils and adenoids were removed, but the respiratory infections did not improve - he developed asthma.

In 1977 we were told to consult an allergist, he was tested, and found to have many allergies. He has been on a desensitizing program now for a year and a half - with no improvement.

He started school last September 7 miles across town, as "his" school was closed due to chemicals - chemicals in the air, and on the playground where he and all the children played.

He started the school year off with an abscess in his nose - he was on antibiotics - he had repeated respiratory infections, attacks of asthma.

By this time we the people were well aware of Love Canal, as was our children, my son, went into a depression, withdrawing, from the school, and his Mother and Father, he begged to leave.

I promised, we would leave soon!

One night last winter I got up to go to the bathroom - I looked in on him, his bed was empty. I looked all over, it was 2:00 a.m. I heard a cry from under the couch, my son was under there with his knees drawn up to his chin, crying. I asked him to come out, and what was wrong. His reply, "I want to die, I don't want to live here anymore - I know you will be sick again and I'll be sick again".

My husband and my son and I cried together that night.

We went to a Councillor with Family and Children Services. The Councillor arranged for a change of school, for he was refusing to go to school, he would stay in bed night and day.

We did all we knew to reassure him, we changed the school, he had been out about 8 weeks. We did get him back in school and he was doing fine, then two weeks ago another bronchial infection - more antibiotics and medications.

The 22nd of March, back to the Doctor. The antibiotics didn't work. It was changed to another - we went to the hospital, more blood work, chest X-rays. The Doctor knows my son is sick, but they don't know how to help him. I do -- get him out! Him, and all the sick people out -- out of the contaminated Hell we live in.

December 8, 1938 was my birth date. December 8, 1978 I celebrated my 40th year by getting up at 5:00 a.m., going out in zero weather to walk a picket, the air we breathed was so cold and heavy with chemical stink, that we could taste it.

We neighbors, out of desperation, walked together, to halt the movements of trucks from the Canal site into our neighborhood - for now - we knew of over 200 chemicals brewing beneath our soil, and Dioxin - Dioxin one of the most deadly poisons known to mankind. We also knew Radiation was at the Love Canal.

We publicly protested these crimes. We had been made to feel that we were the criminals! We are not - we are the victims!

SO WE PROTESTED!

I was arrested, as 15 others were, for being victimized by Occidental Petroleum Corporation (Hooker Chemical's Parent Company), the U.S. Army, the State of New York, the City of Niagara Falls, and the School Board for knowing from day ONE.

Knowing the chemicals were there -Hooker knew- Why did they not stress this to the School Board?

They are a big Company, they produce their chemicals - surely they had some idea of what the chemicals could do.

The people of Love Canal know now what they have done - they have produced children with extra fingers, extra toes, double rows of teeth, cleft palate, enlarged hearts, vision and hearing impairment and retardation.

State officials announced on February 8, 1979 that all children under 2 and pregnant women should be moved out of the area. If it's not safe for them, what about my child - he's not 2 years old, but he was 2 once, he was born here and he's sick, he was when he was 2, now he's 10 and he's still sick.

And what about pregnancies?

Many women cannot get pregnant because they've had hysterectomies due to excessive bleeding, tumors and cancer at young ages - ages 20 to 30.

I, myself, am in this group.

Dr. Beverly Paigen, a cancer researcher at Buffalo's Roswell Park Memorial Institute, who has worked with the Love Canal Homeowner's Association for months, says analysis of health data collected by the Association shows incidents of attempted suicides, nervous breakdowns, hyperactive children, epilepsy, asthma and urinary tract problems occurring 3 to 4 times higher among residents living in the wet areas compared to dry areas. Dr. Paigen said the data indicated 24 of the 120 children born to women living in the wet areas had birth defects. In the 5 years from 1974 through 1978, 9 of the 16 children born to women in the wet areas had birth defects - a rate of 56%.

Dr. Paigen says 39 of 155 pregnancies in this area end in miscarriages - a rate far above the national average.

The wet areas She refers to are swale or old stream beds that are suspected of carrying the toxic chemicals from the former Hooker Chemicals land fill, or Love Canal.

I am a sick woman, nursing a sick child. My thoughts are - will he live to have children, if so, will they be sick or deformed?

Man made chemicals are not to be lived with 24 hours a day, for years.

We are not guinea pigs.

We are humans. Humans with human needs! We want hope, for our children, we want simple things like a spring garden, even this has been denied us since the State has said the vegetables may not be safe for human consumption.

-4-

But for years, my family has eaten vegetables grown in our yard. Also vegetables grown at the Canal edge, for a friend lived on 99th Street and grew them. Her Husband died 5 years ago from cancer, her son 6 months later from cancer. The State moved her out of her home, a home she had lived in over 20 years.

The State's air test showed chemicals in her home, but there are readings outside of the 99th Street area, higher than her's were.

One such home is up the street from my home, a 9 year old child asked State Officials, at a public meeting, Will I grow up to be a normal Man?

The State had told his parents not to let him sleep in his bedroom for chemicals are there. The boy has asthma, his Father has asthma, his Mother and little Brother have epilepsy.

They remain in that home, for they do not have the financial means to get out, like everyone else

I believe most Americans assume that the Government would be there when they need help, but the people of the Love Canal area are now very disillusioned. Is this belief wrong? For the people of the Love Canal feel a hopelessness. Are we not Americans?

Our City, our State has done nothing to help the people in the areas outside of 99th and 97th streets, if our Federal Government does not help us, we are all doomed at Love Canal.

May God help us and our Country, for we need help, desperately.

Anne Hillis
432 - 102nd Street
Niagara Falls, New York 14304

March 28, 1979

AH:jcn ...

LOVE CANAL

Testimony Submitted to the House Sub-Committee on Oversight
and Investigations

April 2, 1979

by Luella Kenny

Introduction

My name is Luella Kenny. I am a cancer research assistant at Roswell Park Memorial Institute in Buffalo, New York. I reside at 1064-96th Street, Niagara Falls, N.Y., which is located approximately 0.1 of a mile from the northern boundary of the Love Canal. My husband and I with our two surviving sons reside at this location. An old stream bed, which intersected with Love Canal, runs through our property. This stream bed is now filled and is part of our yard. In addition, at the back edge of our property is Black Creek which has been found to be contaminated with chemicals by the Environmental Protection Agency and by the New York State Health Department. Also located on this property is a storm sewer which drains the area north of the Love Canal. Our seven year old son died last October 4th from complications that resulted from nephrosis.

Jon's death

Up to June 6th, 1978, Jon had been a healthy little boy. On that date he had some swelling. On June 8th this swelling was diagnosed as being due to an allergy, and an antihistamine was prescribed. I took Jon back to the doctor's on June 26th when his stomach was beginning to swell. The allergy diagnosis still stood. Nephrosis in its early stages is often masked by symptoms resembling allergies. On July 1st, when there was no improvement, I took Jon back to the pediatrician and at that time we were sent directly to the hospital because protein was observed in the urine and nephrosis was suspected. Further tests in the hospital confirmed this diagnosis and the standard treatment with prednisone was started. Jon responded well to the drug and within one week his urine was free of protein, but he remained hospitalized and on prednisone until July 25th, 1978. Nephrosis in 75% of the cases is a recurrent disease, which disappears about age 14. Therefore, we were referred to the renal clinic at Buffalo's Childrens Hospital. We visited the clinic on August 2nd for the first time and Jon was fine. He had not been taking prednisone since July 25th. We had to test Jon's urine twice a day at home, and keep a record of protein readings as well as weight fluctuations due to fluid retention.

On August 14th the protein reappeared in the urine and Jon was hospitalized for one day on August 22nd and a two-month prednisone treatment was begun. By August 31st the protein had again disappeared. On September 13th we again visited the renal clinic and the only problem at that time was a slightly elevated blood pressure. This is a common occurrence with prednisone treatment, so the dosage was lowered. On September 16th protein was present in the urine.

On September 22nd Jon was sent home from school with a headache and dry heaves. During the night we rushed him to a local hospital because he was having convulsions and he did not respond to any stimuli. He was transferred to Buffalo's Childrens Hospital and put into the intensive care unit where a team of specialists were called in for consultations, but were unable to explain why Jon was having the convulsions. Jon's elevated blood pressure was listed as the probable cause, but the doctors were not completely convinced because most children with nephrosis have had much higher pressures.

After two days Jon began to respond, but he was having visual hallucinations for the next couple of days. Jon was released from the hospital on September 29th. At that time the protein in his urine was very high and his entire body was swollen because of fluid retention. By Sunday, October 1st Jon had difficulty breathing and could not hold down any food. We took him back to Children's Hospital on October 2nd where his condition continued to deteriorate and the doctors couldn't understand what was happening. He died on October 4th after having had a cardiac arrest brought on by the exertion in trying to breathe. We later found out that he had a massive pulmonary embolism - an extraordinarily rare complication of nephrosis.

At the time of Jon's death we had no idea that it could be linked to chemical toxicity. We requested an autopsy because we wanted to know why our son had died when we had been told all along that nephrosis was nothing to worry about. To quote the urologist at Children's Hospital, "Nephrosis is the best disease a child can have, because it can be cured". However, this same doctor was puzzled by the fact that Jon's symptoms were not typical, particularly the convulsions, nor did he respond to treatment as expected.

Response of the New York State Health Department

The death of a seven year old so close to the Love Canal was picked up by the news media in the area. In fact, we learned in October by reading the newspaper that the State was planning an investigation of Jon's death. However, the State did not contact us. On February 8th, 1979, I attended a public meeting for Love Canal residents and I openly asked Dr. Axelrod, New York State's Commissioner of Health, about the investigation that I had read about in the paper. Dr. Axelrod informed me that an investigation had been conducted and we would hear from the State shortly in order to discuss the matter privately. On February 24th I sent a letter to Dr. Axelrod reminding him of our conversation on February 8th. When there was no response to this letter, a second letter was sent on March 23rd to Dr. Steven Kim, who is in charge of the environmental studies at Love Canal. Dr. Kim called me on March 26th and it was at this time that we learned the creek adjacent to our property was chemically contaminated. This information has taken us several months to learn because all the samples that were collected from the creek kept getting lost. Dr. Kim was unable to answer our questions about Jon so he directed us to Dr. Nicholas Vianna, the epidemiologist in charge of health studies at Love Canal. I called Dr. Vianna on March 27th and he suggested that I go back to Children's Hospital for answers to my questions. Actually, I had already tried to get the final report from Children's Hospital and I was told that it was not completed. On March 28th I received a phone call from Dr. Haughie of the New York State Health Department, informing me that he had contacted my pediatrician and the urologist and pathologist from Children's Hospital on March 27th. He informed me that the final autopsy report was not ready, but it should be ready in a few days.

Meanwhile, we are living in a home that could possibly have killed one child and we're worrying about our two other children. Our twelve year old son complains of headaches and he has a kidney problem. Our ten year old son has anorexia nervosa (loss of appetite) and frequent nosebleeds. The latter symptom was one of Jon's first symptoms. Are we being poisoned by the chemicals in the adjacent creek, and possibly by chemicals migrating through the major swale that runs under our property? My husband likes to garden, but last spring none of the seeds he planted germinated. We are currently checking the possibility of chemical contamination in our yard by having our soil analyzed.

Did Love Canal Chemicals cause Jon's Death

Since my husband and I are both scientists, we started our own investigation into what may have caused Jon's death. We have spent hours in medical libraries delving into the current research being done in the field of nephrosis and also searching the older literature. In addition, we have corresponded with some of this country's leading research groups, who are currently working on nephrosis. By doing this we had hoped to learn as much as possible about the disease, and we have postulated some possible theories.

The first theory evolved from the fact that current research shows that nephrosis is linked to immunological responses. Many of the chemicals identified in Love Canal suppress immunological responses. Many Love Canal residents claim that they get more frequent colds, bronchitis, ear infections, and pneumonia. This would be expected if immune responses were impaired. Some neighbors who live on the same swale as our house have very low white blood counts (1000 and 3000 instead of a normal 10,000) as might be expected if chemicals were interfering with the immune response. Jon was our only child who was born after we moved into this house. Were his immunological responses suppressed by these chemicals? Did this suppression of immune response lead to his nephrosis or make it more difficult for him to cope with the nephrosis?

Our second theory is that Jon may have been the one in 15,000 that would have developed nephrosis, but that the chemicals triggered relapses. Therefore with constant relapses because of continual exposure to chemicals, his system never had a chance to rebuild before it was down again. Several of the Love Canal chemicals are renal poisons and do damage the kidney.

Our third hypothesis is that toxic chemicals were stored in Jon's body, probably in the fat. During Jon's illness, either because of the stress of the illness or because of the prednisone treatment, the fat reserves were mobilized thus releasing these toxic chemicals from storage. The toxicity of these chemicals and the illness combined were too much for Jon.

Conclusion

We do not know if any of these theories are right. We do want a thorough investigation of Jon's death by specialists in renal toxicology. We know that this cannot bring Jon back nor in any way ease our sense of loss, but we have a responsibility to our other two sons and to all the other children living in Love Canal.

Although these facts are not conclusive, they do indicate that the factor of chemical toxicity is highly probable and possible in causing Jon's death.

As Jon's mother the realization that Jon was a victim of chemical poisoning is a horrible nightmare. During these brief seven years I was so concerned that he received the proper food and was properly clothed yet all my love and care were in vain because of a chemical dump that I knew nothing about. And now that I know about the dump, I am powerless to protect my other two children from exposure to these killing chemicals.

Senate Subcommittee of Toxic Substances and Chemical Wastes

Grace M. McCoulf

Resident of the Love Canal Area

April 5, 1979

My name is Grace McCoulf. I am a housewife and mother of two small children. I live in the Love Canal. The Love Canal is a Chemical Dumpsite used by at least one major chemical company to dispose of hundreds of hazardous wastes over a period of 30 years.

Hundreds of problems have occurred over recent months all resulting from the Love Canal. The families affected have mental, physical and psychological problems directly stemming from the hazardous dumpsite. The Love Canal tragedy has occurred and because it occurred many eyes across the country have been opened. The Love Canal has served as an education for other areas thought to be similar in make up. The Love Canal is fortunate enough to have a fine team of residents who have educated themselves and are able to travel to other areas to lecture on the problems of such sites. With an educated population pushing the politicians and bringing to light all potential problems related to hazardous dumping, the politicians can help with new and more effective laws - - laws which will be and must be enforced to their fullest!! With such powerful laws, the chemical industry must find alternate legal ways to dispose of wastes. Laws are great but laws are useless unless they are enforced and when enforced, they must bring the offenders to their knees and making sure any offender is liable for all problems caused.

Because of all that has happened, it has come time for the Federal Government to perform its primary function - - to serve the interest of the people. Its time to show the entire United States population that there is a budget other than the Foreign Aid Budget. The American people see only the billions shipped out to strangers and never see the aid given to the needy citizens who are the ones paying the taxes - - the same taxes going overseas. Who needs it more?

- 2 -

We, the people have been very patient in our efforts to obtain the basic human rights. After all, we consist soley of innocent third party victims. We did nothing wrong. We are the victims but in reality, we are treated like the wrong doers! Can you tell us why?

People around the nation as well as groups in the State of New York realize this is critical to our country's future. Some of these organizations who support the permanent relocation of residents affected by the Love Canal and the clean up of our environment are: Operation Clean. United Auto Workers Union. Sierra Club, A F L - C I O, Niagara-Orleans Council of Churches. Bloody Run Association, West Valley Nuclear Association. Buffalo Workers Union, Small Business Assoc., Goodyear Local 277. Oil, Chemical and Atomic Workers Union Local 593, Union Carbide Local 8-250, Mission Peace for The Children. and in whole, the National Council of Churches. In addition, the national coverage of our plight has reached out from the Phil Donahue Show and A B C Close Up, "The Killing Ground". The national response to our plight is remarkable. The people are more concerned than the Federal Government.

We are the victims, and we want only what is right. The way the problem is being handled by the State and by the courts, we must sit and rot in this deteriorating environment. We are left with the responsibility of deciding to have another child here and worrying about weighing the odds of conceiving a child with a birth defect. Why should we be trapped into such a corner. New York State is telling us to practice birth control. We must watch our families deteriorate and our health suffer. Our children are sick, our homes are valueless and we have boarded up homes for neighbors. The entire meaning of family has been corroded. We are now at our limit. We can wait no longer. While the industries and local governments who created this problem stall and point their finger at the next guy, the victims suffer. While our state and Federal Government drag their feet and do nothing.

we, the victims are left to die. Well, we are through waiting. We are through being insulted with the States ideas of help and with the states idea of remedy. Their remedy is actually taking two steps backwards. The guilty parties are dragging us down. Our lives are ruined. Well, it's our turn to drag down a few guilty parties.

We have mentioned our supporters earlier. I don't believe I have to count the total number of votes they represent. The National Council of Churches alone represents millions of votes and believe me, they are our best supporters. We have grown from a tattered neighborhood group to a real national power, but that is just a grain of sand on a beach. We will get what should have been ours from the start- - safe and healthy homes to raise our families without fear of the unknown. We are determined to overcome the obstacles. There is more money spent on trivias with us here than there would be to buy our homes and get us out. Remove the people, then decide what you will do with the area. We the people of the Love Canal are worried, sick and very disappointed with our government who is supposed to be there working for the people and not against us. We want our children and grandchildren to have a future worth living for.

Dc

Denote the committee on Toxic Substances and chemical
wastes.

"Gentlemen, Hello!"

My name is Louise Meark. I have lived in
the city of Niagara Falls my entire life.

I used to love my city, my state, I hate them
now.

My family, my parents, one sister and one
brother moved to 101st Street in O'Fallon, a sub-
urb of the city (now known as the Erie Canal)
when I was 8 years old.

At the time we moved into our new home, we
were all relatively healthy save for a cold or a
few virus occasionally.

About 3 years later, I began having men-
strual periods. They were never regular, and are
still abnormal. Severe cramping always came
without it to a point of being bed ridden. A year
after that, my younger sister began suffering
with the same.

My Mother who suffers with migraine
headaches, has become increasingly worse as
time goes on. She has been hospitalized several
times. There is nothing she can do to prevent
them from coming. They last usually from an
8 to a 24 hour period. (page one.)

When I was about 12 years of age - I at that time experienced an intense burning pain in urination. When I showed my Doctor and explained my symptoms, he, (my Doctor) seemed surprised -- taken aback at my words. He claimed that what my symptoms had indicated, was that I had a severe kidney and bladder urinary tract infection, most commonly known in married or sexually active women. (I exclaimed, "But I'm not sexually active.") He then stated he would send medication and again claimed it a rare happening. Several years later, my sister experienced what I had. We still suffer these.

After that time I became extremely ill. I began having awful chest pain. It took weeks of suffering and worry before being diagnosed as a nervous disorder. I was given tranquilizers. I still take them as needed.

2 years later a family member tried to commit suicide. Once again a few years later.

13 years old, my scalp hair began falling out. My hair had to be cut very short. I wore a wig for 6 months.

(page two)

4 1/2 years later, I was married.

After leaving that house, my brother 4 years younger than myself, became allergic to the heat in the house.

My Dad began suffering hearing loss and nose bleeds, and Mom's headaches increased.

My female problems followed me where I went. A few blocks away, for I had 2 miscarriages after my son was born, and I had a spontaneous abortion in my present home. Totaling child loss to 3.

But my nerves calmed down drastically.

My son was born with a facial muscle disorder and stomach problems - all birth defects.

3 years after leaving the area, we were back. Unknown to us, that I as a young girl had been chemically contaminated by living in that area.

We moved into a home I loved, a neighborhood I knew, and we were very happy. We had so many plans for our new home. It was our first.

(page three.)

Our dreams became our nightmare. My husband developed sinus problems, constant upset stomach and poor circulation among other things.

I became asthmatic on top of all of my other problems, and suffer allergic reactions along with the asthma attacks.

Our son suffers extreme painful leg cramps, and his stomach bothers him more than ever. He takes medication. I have cortisone treatments. I could go on and on. It would take hours.

Our most recent upset, is that since it is unsafe to have another child in this area, "what do we do?"

The State Health department says we're safe. But, - don't have any more children, don't grow a garden, and don't go in your contaminated rooms in your home.

Our son is lonely, he has no one when his friends go home. He asks for a new brother often. "What can we tell him?" We used to be able to say, "We will one day, just as." Now, we can't even do that.

(Page four.)

The crust when our friends baby went home one day. He wanted her to live with us. My arms ache to hold another child of my own. - I fear that will never be.

The state has been playing with our lives. They give us hope and then knock us down. They use us as open cushions for blood tests, and have us fill out health surveys they conveniently make. We are being sacrificed. We know this. We are wise to them. We know we're in danger. We live here. We feel the illnesses.

Our home has a 433 toluene level in it. It jumped 408 points higher than the first reading. (the second time around.) We shouldn't have to live in that. We shouldn't have a reading at all. Toluene is known to aggravate respiratory problems. This explains my asthmatic condition don't you think?

(page five.)

Dow Chemical should be held responsible for standing by and watching homes being built on their chemical time bomb in the Bay Canal. They should be made to clean up each and every one of their dump sites - at whatever the cost.

And, should be made by government laws to build high heat incineration machines at all plants, regardless of their cost. It will not only save human lives, of which there is no price on, it will be beneficial to our safe and clean environment.

As former dump sites are discovered, they should be evacuated first and cleaned up as well as can be, and should be uninhabited by human beings.

Let's hope there will be no other such sites. But, if for present and future sites, they should set up strict regulations (the U.S. Government.) to protect everyone. Again, no matter what, the cost.

(page six)

If not by the Government it should be mandatory for the chemical corporations. Would you rather pay now, or later?

Our Government does have the money. Later, will you not only have to pay highly for clean up efforts, but, perhaps in lives.

Some could be your own loved ones.

What will our future generations think of our so called "Great Nation", if we destroy it for them.

Our Country is in serious trouble. We're killing our own kind. The ABC documentary, "The Killing Ground", hit the nail right on the head. We should all be grateful to them and people like Mr. Beverly Paiger for bringing this matter to public attention.

I strongly urge anyone who has not seen the film, "The China Syndrome" to do so. The impact is so great, and not so hard to imagine anymore.

(page seven.)

Our children talk of being sick and of chemicals hurting us - and of death at their tender ages. We do not prompt them. We try to hide it, to shelter them. But, they know. They know more themselves, than the state will admit to. If the state thinks it's so safe, why have children under 2 and pregnant women been mord out.

'Do you really believe that it's unsafe for them, and safe - for my 3 year old son.'

'This isn't normal in an average community is it?' (My husband is waiting for a fourth blood test result. Three were abnormal. "Why?" Is he very ill, or is it another one in hundreds of incompetent actions taken by the New York State Health Dept..

The state and local government claim they have never dealt with a disaster of this kind - Therefore, they do not know how to handle it. It seems to me that any child should be able to figure out that in a situation such as this, complete and total evacuation should take place. (page eight.)

(I personally think it can never be properly cleaned up.) "And, what of our United States Government?"

Our President uses millions of our taxpayers dollars for other countries. "Why not our own?" We are in greater need. Our lives are at stake. Make us out, for you'll never hear the end of us.

"Don't you think it would be best to make us out and get us out of the press?" If the community can get back its complexion as one State man put it, you'll have other people who may want to live here. Let those who wish to leave go. We don't want to be failed any more than you would want to.

And last but definitely not least, give us - the people of the Five Carol some new faith in our nation. We've been so disillusioned.

Save us from our untimely deaths.

(.page.nine.)

I don't want to have to cry anymore,
and be reminded of the babies I've lost, al-
though I will never be able to forget.

"I think of what your
daughters and granddaughters would feel!"

I wonder if I'll ever be a mother
again, and experience that ultimate
joy. Give my son the chance to have
his baby brother.

(page ten)

I thank you!
Laurel Newark
Fox Condo Victim

STATEMENT OF JOSEPH T. PILLITTERE, ASSEMBLYMAN, NEW YORK STATE ASSEMBLY

IT IS OFTEN TRUE THAT THE LESSONS OF THE PAST PROVIDE THE KEY FOR UNLOCKING THE STORE OF SOLUTIONS TO THE PROBLEMS OF THE PRESENT.

SUCH IS THE CASE IN NIAGARA COUNTY TODAY AS WE DISCUSS THE PROBLEMS OF TOXIC WASTE DISPOSAL.

NINE MONTHS AGO, ONE OF THE WORST MAN-MADE DISASTERS IN HISTORY ERUPTED IN THE LOVE CANAL CAUSING UNDUE GRIEF AND MISERY TO MANY RESIDENTS IN THE COMMUNITY.

ALTHOUGH THE TOXIC WASTE PROBLEM HAS BEEN HIGHLIGHTED BY THE LOVE CANAL, WE CANNOT AFFORD TO BECOME COMPLACENT AND FOCUS OUR COMPLETE ATTENTION TO THAT AREA.

NIAGARA COUNTY RESIDENTS, UNFORTUNATELY, NOT ONLY HAVE TO CONTEND WITH THE LOVE CANAL BUT THE LIKES OF BLOODY RUN, 56TH STREET DUMP, 102ND STREET DUMP, AND CHEMICAL CONTAMINATION IN LEWISTON.

THE INDISCRIMINATE DUMPING OF HAZARDOUS WASTES IN NIAGARA FALLS AND SURROUNDING AREAS HAS TAKEN A DEVASTATING TOLL ON HEALTH AND ENVIRONMENT.

NIAGARA COUNTY RESIDENTS ARE ANGRY AT THE SEEING RELUCTANCE OF ^{THE} ~~A~~ FEDERAL GOVERNMENT TO GET INVOLVED IN A PROBLEM THAT IS CLEARLY ONE OF NATIONAL CONCERN.

2-2-2

THE CONTROL OF HAZARDOUS SUBSTANCES IS ONE OF THE MOST IMPORTANT ENVIRONMENTAL ISSUES OF OUR TIME. IN RECENT YEARS, WE HAVE LEARNED THAT THE FOOD WE EAT, THE WATER WE DRINK, AND THE AIR WE BREATHE MAY CONTAIN MATERIALS HARMFUL TO OUR HEALTH.

RECENTLY, THE INTERAGENCY TASK FORCE ON HAZARDOUS WASTES IDENTIFIED 106 DISPOSAL SITES IN NIAGARA COUNTY CONTAINING SOME OF THE MOST DEADLY TOXINS KNOWN TO MAN.

INSTITUTING A MAJOR CLEAN-UP OF THESE AREAS IS A MONUMENTAL TASK TOO GREAT FOR THE STATE OF NEW YORK. THE PEOPLE OF THIS GREAT NATION HAVE RECEIVED MANY BENEFITS FROM NEW YORK'S INDUSTRIAL AND CHEMICAL INDUSTRIES.

MAN'S DEPENDENCY ON CHEMICALS WILL NOT CEASE BECAUSE OF THE PROBLEMS ASSOCIATED WITH THEIR MANUFACTURE. THEIR VALUE TO SOCIETY IS NOT WHAT WE QUESTION.

HOWEVER, THE HAZARDOUS WASTE PROBLEMS CAUSED AS A RESULT OF THESE INDUSTRIES PRODUCTS MUST NOW BE RECOGNIZED AS A MATTER OF NATIONAL CONCERN AND RESPONSIBILITY.

ON THAT NOTE, I WOULD LIKE TO OFFER MY FULL SUPPORT OF THE TOXIC WASTE AND TORT ACT CURRENTLY BEING SPONSORED BY CONGRESSMAN LAFALCE AND SENATOR MOYNIHAN.

THIS LEGISLATION WHICH YOU HAVE PROPOSED WILL OFFER NOT ONLY SORELY NEEDED FINANCIAL ASSISTANCE BUT WILL ALSO FIRMLY ESTABLISH THE PRINIPLE OF INDUSTRIAL RESPONSIBILITY FOR PREVENTING DANGER TO THE PUBLIC'S HEALTH. IN BOTH RESPECTS, THIS LEGISLATION IS HIGHLY SIGNIFICANT.

FURTHERMORE, I URGE THE CONGRESS AND THE SENTE TO ACT IMMEDIATELY ON THE PASSAGE OF THIS BILL SO THAT THE STATE CAN BEGIN WORKING ON ANY COMPANION LEGISLATION NECESSARY FOR THE FUTURE.

SOLVING THE PROBLEMS CREATED BY HAZARDOUS WASTES WARRANTS THE ASSISTANCE OF THE FEDERAL GOVERNMENT.

ONE THOUGHT SHOULD NEVER LEAVE OUR MINDS. WHILE WE STAND HERE TODAY DISCUSSING THIS PROBLEM, MUCH OF THE GROUND IN *COUNTY NIAGARA FALLS* CONTINUES TO LEACH AND OOZE TOXIC MATERIALS.

MY PRIME CONCERN IS THAT THE CONCEPT OF A SUPERFUND MUST BE LARGE ENOUGH TO COVER ALL EXPENSES INCURRED IN A CLEAN-UP OPERATION AND THAT NEW YORK STATE RECEIVES ITS APPROPRIATE SHARE.

WHILE THE FEDERAL GOVERNMENT CONTINUES TO DRAG ITS FEET IN THIS SITUATION, THE PEOPLE IN NIAGARA COUNTY ARE FORCED TO REMAIN PATIENT.

OUR PATIENCE, GENTLEMEN, HAS RUN OUT. WE ARE TIRED OF WAITING FOR THE FEDERAL GOVERNMENT TO DEVELOP LEGISLATION.

WE ARE TIRED OF LISTENING AND NOT SEEING ANY CONCRETE LAWS THAT WILL PROTECT US FROM FUTURE LOVE CANALS.

HOW MUCH LONGER DO YOU EXPECT US TO SIT BACK AND OBSERVE? EVIDENCE EXISTS THAT CLEARLY SHOWS PRIVATE INDUSTRY WAS WELL AWARE OF THE HEALTH HAZARDS IN THE LOVE CANAL AREA.

THE STATE LEGISLATURE HAS APPOINTED A TASK FORCE ON DISCLOSURE OF PUBLIC HAZARDS TO SPECIFICALLY INVESTIGATE ALLEGED REPORTS OF A COVER-UP.

PRIVATE INDUSTRY AND GOVERNMENT HAVE IGNORED THE HAZARDOUS WASTE PROBLEM FOR TOO LONG. IT IS NO LONGER A MAJOR PROBLEM JUST IN NEW YORK. HIGHLY CONTAMINATED SITES ARE BEING DISCOVERED ALL ACROSS THE COUNTRY ON A DAILY BASIS.

THIS PROBLEM IS TOO GREAT FOR ANY STATE TO CARRY ALONE. IT IS OF NATIONAL SCOPE AND AS SUCH DESERVES NOT ONLY YOUR IMMEDIATE ATTENTION BUT THAT OF EVERY LAWMAKER IN THE NATION.

NEW YORK STATE CANNOT POSSIBLY REGULATE ITS CHEMICAL INDUSTRIES WITHOUT SOME FIRMLY ESTABLISHED GUIDELINES FROM THE FEDERAL GOVERNMENT.

TO COMPLEMENT THE FEDERAL GOVERNMENT'S LEGISLATION, IT IS NECESSARY FOR THE STATE TO DEVELOP ITS OWN LAWS.

EARLIER THIS MONTH, MY COLLEAGUES IN THE ASSEMBLY AND THE SENATE PROPOSED LEGISLATION THAT WILL ALLOW THE STATE TO BORROW \$150 MILLION FOR CONSTRUCTION OF WASTE DISPOSAL CENTERS AT SEVERAL LOCATIONS IN THE STATE.

THESE STATE FACILITIES WOULD UTILIZE INCINERATION, CHEMICAL AND PHYSICAL TECHNIQUES TO DESTROY TOXIC CHEMICAL WASTES. USER FEES CHARGED TO CHEMICAL PRODUCERS WOULD REPAY THE BORROWING OF BONDS.

I WHOLEHEARTEDLY ENDORSE THIS PROPOSAL AND CALL UPON THE FEDERAL GOVERNMENT TO PROVIDE MATCHING FUNDS WHICH WOULD ASSIST THE STATE IN BUILDING THESE FACILITIES.

IF NEW YORK STATE IS WILLING TO MAKE A MAJOR COMMITMENT TO CONTROL HAZARDOUS WASTE DISPOSAL, THE FEDERAL GOVERNMENT SHOULD BE WILLING TO SUPPLY MATCHING FUNDS.

ALONG WITH THAT PROPOSAL, I HAVE INTRODUCED LEGISLATION THAT WILL GRANT EMERGENCY POWERS TO THE COMMISSIONER OF ENVIRONMENTAL CONSERVATION TO BAN THE IMPORTATION INTO NEW YORK STATE OF ANY HAZARDOUS WASTE WHICH IS FOUND TO POSE ANY IMMINENT PERIL TO HEALTH OR ENVIRONMENT.

THIS BILL, WHILE PROVIDING FOR A SYSTEMATIC STATE-WIDE CLEAN-UP OF EXISTING DUMP SITES, PLACES THE FINANCIAL RESPONSIBILITY FOR CLEAN-UP WHERE IT BELONGS: ON THE INDUSTRIES WHICH PRODUCE TOXIC WASTES, AND PARTICULARLY ON THE COMPANIES WHICH CREATE EXISTING DUMPS.

ALTHOUGH WE HAVE NO CONTROL OVER WHAT HAPPENED IN THE PAST, WE CANNOT ALLOW THIS PROBLEM TO CONTINUE MOUNTING AT ITS PRESENT RATE.

I PLEDGE MY FULL COOPERATION AND SUPPORT TO OUR FEDERAL REPRESENTATIVES AND INTEND TO CONTINUE WORKING ON BEHALF OF NIAGARA COUNTY RESIDENTS TO SEE THAT THIS ISSUE IS FINALLY RESOLVED.

THANK-YOU.

Senate subcommittee on Toxic Substances & Chemical Wastes

Marie Pozniak

Resident of the Love Canal Area

May 3, 1979

My name is Marie Pozniak, I reside with my family on Colvin Boulevard, the Love Canal area of Niagara Falls, New York. I live two houses from the last boarded up house and I have lived there for the last eight years. The last year has been one filled with confusion and stress due to the mishandling of the situation.

I would like to address the issue of what can be done to prevent future occurrences such as the Love Canal. However, I would like to express the necessity to identify, monitor and clean up all dump sites both open and festering and those buried and forgotten ticking away as public health time bombs. It is not too late to stop what will in time be a irreversible situation. If any further dumping is allowed future generations will suffer irreparable damage.

We need to immediately pass laws and form agencies who can and will take on the responsibilities of finding and cleaning up these dump sites.

From my own experience living in the Love Canal area I have watched the New York State Health Department as well as some Federal agencies avoid issues so that they would not have to take and responsibility or set any precedents.

Example: New York Governor Hugh Carey, at a public meeting made the statement that if people in the houses not immediately evacuated had health problems and air tests showed contamination they would be relocated permanently. The State Health Department air test did in fact show chemicals to present in my home. On the advise of two different doctors I submitted the records of my nine year old daughter, who has an astmatic condition, to the Health Department for review. They said it would take a week. The United Way Agency upon seeing the two doctors statements

- 2 -

immediately acted and provided accommodations so that she would not be further exposed to the chemical vapors. Then for nine weeks the State Health Department kept saying a few more days would be needed and then a few more. I then received a certified letter in the mail as did 54 other families who had requested relocation, that the remedial construction would not hurt her. As I did not intend to have her employed on the construction crew I thought the letter ridiculous and insulting. I had to ask myself, had they even looked at her records? If they had, they would have had to agree with her two doctors who treat her and know her history. that further exposure would be harmful to her well-being. After having her live away from her home and family for five months, during which time she had only a sore throat. We were forced to bring her home late in December of 1978 due to finances. She became ill immediately and has had to take many varied prescriptions to try to control the problems. The State Health Department's action in the Love Canal area clearly shows they can not handle this job efficiently and objectively.

These state and local governments are the same people who will be handling the future dump sites and I am fearful if they handle them the way they have handled the Love Canal, the ecology as a whole will be ruined!

Industry has been getting away with too much, for too long. We can no longer as citizens afford to pay the price of their doing business. The health and safety of our friends, ourselves and our families is too high a price to pay. It is up to the citizens here today as well as you our Senators and Assemblymen to avoid future dump site disasters. Implement laws NOW to stop neglegent polluters, fine them, take the profit out of polluting and protect our health and environment before it is completely destroyed. Maybe

- 3 -

incineration is the answer, as the Love Canal has shown that secure land fills are not the answer.

We will long be remembered for our fight for clean air, water and most important clean and safe homes. It started in our small community and has grown and spread across our nation. We now have millions of people backing our struggle. Teachers, clergy, environmental groups, unions and more are actively involved. The Love Canals remaining victims, do not have to remain victims. The laws that are passed could and should morally include them.

Gentlemen go back to Washington and tell your peers, the Love Canal people and our children, who are the future of America demand immediate action on our disaster, man made, but still a disaster because our homes are destroyed, as well as the health of us and our children by chemical contamination. Pass the needed laws and set a precedent and help the victims of the Love Canal.

NORMAN B. RICHARD, M.D.
1077 DELAWARE ROAD
KINMORE, N.Y. 11223
873-3337

Protective Agency

August 25, 1978

To Whom It May Concern

RE: Kim Pozniak

Kim suffers from bronchial asthma. Continued exposure to noxious fumes and vapors may be deleterious to her respiratory status. Therefore, she should be removed from such an environment.

Very truly yours,

Norman B. Richard, M.D.

NBR/ss

1002 Colvin Blvd - Toluene 18 $\mu\text{g}/\text{m}^3$

Tanya relocation up Wed 8/30/78

11-28-78 ^{Air Sample} Chloroform 3
Benzene 11
trichloroethene 2
toluene 38
tetrachloroethene 2

WILLIAM J. McMAHON, M. D.
Diseases of Infants & Children
513 3rd ST.
NIAGARA FALLS, N. Y. 14301
Telephone 284-5046

August 22, 1978

TO WHOM IT MAY CONCERN :

Re : Pozniak, Kimberly
Age : 8 $\frac{1}{2}$ yrs.

The above named is an asthmatic and is now under a desensitization program for same.

Any pungent odors or fumes will be detrimental to her physical well being.

Sincerely,

W. J. McMahon MD
Wm. J. McMahon, M.D.

WJM:sep'm

Child needs immediate
evacuation because
of severe asthmatic
condition. (Well being drilled
across from house)

HAZARDOUS AND TOXIC WASTE DISPOSAL

FRIDAY, JUNE 29, 1979

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEES ON ENVIRONMENTAL POLLUTION
AND RESOURCE PROTECTION,
San Francisco, Calif.

The subcommittees met at 1 p.m., pursuant to call, in the sixth floor conference room, EPA Building, Hon. John H. Chafee presiding.

Present: Senator Chafee.

OPENING STATEMENT OF HON. JOHN H. CHAFEE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator CHAFEE. I would like to welcome everybody here today. These hearings are being held as part of a nationwide investigation by the Senate Environment and Public Works Committee into the problems of hazardous wastes and hazardous substances in our environment.

This is sponsored really by two subcommittees of the Environment and Public Works Committee. One is the Resource Protection Subcommittee, of which Senator Culver of Iowa is the chairman, and the other is the Environmental Pollution Subcommittee, which is chaired by Senator Edmund Muskie. I am a member of both of those subcommittees.

What we are attempting to do is to develop comprehensive legislation to deal with abandoned hazardous waste sites, with which you are all quite familiar, as well as other serious releases of hazardous substances into our air, land and water.

The subcommittee meetings have already been held in not only Washington, where we have had several days of hearings, but they have been held in New York and in the Midwest at Charles City, Iowa.

Several bills have been introduced by Members of Congress and by the administration dealing with the effects of oil and hazardous substances in the environment. Certain members of the Senate Environment Committee, including myself, will introduce our own legislation.

We have come here to the west coast to learn what you have accomplished in the hazardous substances and spills matters. It seems to me the best way for us to learn is to come out here and listen to you folks who have been quite close to this.

Many of you might be saying, "But we do have public laws already dealing with these problems." Yes, we do, and we have regulations as well. But there are gaps in these laws, quite serious

gaps. For instance, the laws don't touch on the hundreds and perhaps thousands of abandoned hazardous waste sites for which no remedy has been drafted.

I suspect really we are only beginning to attempt to deal with what is really buried or otherwise present in our land, air and water. I see the next few years as the time when all of us—all of us meaning the Congress, State governments, local governments, industry, and the public—will have to face what is probably going to be the most discouraging, tough and stubborn and perhaps infinitely more serious pollution problem than we have had to face before.

As you all know, in the early and mid-seventies we passed several major environmental laws—the Clean Air Act, the Toxic Substances Control Act, Resource Conservation Recovery Act. And in the water pollution area, for example, I think tremendous progress has been made and literally billions of dollars have been spent in attempting to control the normal effluents and sewage discharge from municipalities and the normal wastes from industries.

But there is a lot still to be done. As I say, now we are moving into what I consider to be an infinitely more complicated and more stubborn and discouraging area and more expensive area, and that is dealing with what might be called the really bad actors, the toxic and hazardous wastes.

As I mentioned before, we are trying to wrestle with how to clean-up abandoned chemical dumps as well as hazardous substances that are going to be released into the atmosphere, into the water, into the land in the future.

The question of what to do with these substances is already there. OK, if you locate them, where are you? It seems to me we are hemmed in on all sides. If we burn them, then it goes into the atmosphere, and in addition we have the sludge. If you bury the substances of sludge, then it seeps into the groundwater and shows up in people's home water supplies. If you put the wastes into water, the oceans, the rivers, obviously it has to be treated or pretreated.

But what is the alternative? It seems to me we just can't throw up our hands. I don't think the answer is less regulation, just let the free enterprise system work and everything will take care of itself, although I am certainly a confirmed free enterprise man. I think one of the most sobering thoughts about all of this is the failure to control these substances can really affect future generations in a very, very serious manner.

Already we have read in the newspapers of the effects of the Love Canal and the Love Canal area, their experience and their higher rates of miscarriages and birth defects. Some of these devastating implications of hazardous wastes getting into the environment are becoming more and more understood.

Groundwater pollution. It is estimated that about 100 million Americans, about half of our population, get their drinking water from groundwater supplies, and springs and wells form the main drinking water reservoir for 32 of our 50 States. So obviously the condition of those groundwater supplies is of extreme importance.

Now a key element in the committee's investigation is the scope of health and natural resources damage suffered as a result of hazardous waste substances. I am particularly interested in the

question of damage assessment. It has come to our attention that the spillage of hazardous substances during transport and the leaking of similar materials from abandoned dump sites pose great risks not only to the public health, as mentioned before, but also to our important natural resources.

How do we go about putting some kind of a damage assessment on these, damages not just to the humans but also to the environment itself?

A great deal of attention is always focused when you have a major spill in the Santa Barbara Channel area, for example. But it has come to our attention in past hearings that the cumulative impacts of smaller spills, really small spills that might easily be neglected in the press or coming to the public's attention, the cumulative effect of those spills is greater or as great as that from the larger spills.

Historically our legal system has been largely ineffective in compensating those who sustain an injury as a result of a spill or other type of discharge of oil or hazardous material into the environment. Trying to recover claims for damages to natural resources through litigation under common law or existing statutory authority is a slow and certainly complex and generally inequitable manner of proceeding.

As in the early seventies, the U.S. Justice Department suggested the creation of a uniform system to compensate for cleanup costs and damages from spills. Last year in the Senate we approved a damage assessment provision as part of a super fund bill which dealt with spills by tankers and primarily transporters of dangerous substances. It mandated a scheme for compensation for loss or damage to natural resources that would assure rapid and equitable recovery to the injured party.

We are going to introduce a similar provision in the legislation this year. So I am particularly interested in hearing the thoughts of our damage assessment panel witnesses since, of course, here in California you have a State law dealing with this matter.

We will also be interested in learning other aspects of the California State hazardous waste management program and additional west coast State programs. We are going to hear from industry, from Chevron, USA. And finally, and of great importance in defining the goals of any legislation, we will solicit the views of local citizens and health specialists.

So this is a very difficult and, as I say, frustrating and annoying problem that I think is going to make us all have to have a lot of patience and be good for the long haul.

It isn't as glamorous as quickly cleaning up a stream. It is far more difficult than that. I just don't think that we in Congress or the public at large should think of it as such an overwhelming problem that it shouldn't be undertaken. I think the solution should be undertaken, and certainly when you think of the consequences to the health of our population or to our natural resources, it encourages us to proceed in our efforts.

Let me just outline how we are going to proceed this afternoon. We have four panels, plus an individual witness. It is our intent to keep going until about 4:30, thereabouts. So we are going to move

along, but nobody is going to be rushed to too great an extent. Conciseness, of course, is always appreciated.

We will start with the California panel, perhaps if you folks would come forward now. That panel is made up of Mr. Peter Weiner, special assistant in the Governor's office; Miss Carla Bard, a member of the California State Water Resource Control Board; Harvey Collins; and Dr. Alvin Gordon. Dr. Gordon is from the California Air Resources Board, and Dr. Collins is the acting chief of the hazardous materials management division.

Mr. Weiner?

Is General Whalen from the State of Washington here?

All right. Since he is not here, why don't we also have Mr. Cowles, who is the deputy commissioner of the Alaska Department of Environmental Conservation. Why don't you come up here, too. If you folks could just slide to your right a little bit and make room for Mr. Cowles. Then we will have the west coast States' representatives. Then we will go to another California panel dealing with the damage assessment question. Then Mr. Gilman, who will be an individual witness. Then the third panel will be Miss Siri and Steve Krefting. Then the last panel will be Dr. Cooper, Dr. Whorton, and Dr. Spear.

We are delighted that you came and appreciate it. Who wants to lead off?

STATEMENTS OF PETER H. WEINER, SPECIAL ASSISTANT, GOVERNOR'S OFFICE; CARLA BARD, MEMBER, CALIFORNIA STATE WATER RESOURCE CONTROL BOARD; HARVEY F. COLLINS, ACTING CHIEF, HAZARDOUS MATERIALS MANAGEMENT DIVISION, CALIFORNIA DEPARTMENT OF PUBLIC HEALTH; ALVIN GORDON, MEMBER, CALIFORNIA AIR RESOURCES BOARD; AND C. DEMING COWLES, DEPUTY COMMISSIONER, ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Mr. WEINER. Thank you, Senator Chafee. On behalf of Governor Brown, I would like to welcome you and the subcommittee staff to California.

As a Nation, and as a planet, we face a historic moment of responsibility. Our health, our environment, and the genetic rights of future generations are increasingly compromised by a rising sea of chemicals. They spill forth on highways, in industry, and from abandoned chemical dumps hidden next door to homes, parks, and even San Francisco Bay. We must act now to prevent future releases, clean up old ones, and assist those who have been injured.

We are justly proud of our leadership in regulating disposal of hazardous waste. But we readily acknowledge the need for greater efforts.

We look forward to working with this committee to develop cost effective, comprehensive, and workable legislation in this area.

I am going to testify today principally with regard to liability and compensation provisions that might be in a proposed bill. Then Ms. Bard, Dr. Collins, and Dr. Gordon will be describing our various environmental regulatory programs.

We are here today in large part to talk about society's failures: spills and abandoned dumps. But arriving with red lights and sirens after the house burns down is flashy and futile.

In structuring a liability and compensation system for current problems, we start from the premise that such a system must provide incentives for prevention: For technological and scientific expertise; for research; and for sufficient information sharing and training. Throwing money into dumps and spills alone is indeed only throwing good money after bad.

We support a comprehensive bill which addresses liability, compensation, and funding for damages caused by releases of hazardous substances. We believe that such a bill should cover all injurious releases regardless of the source. It is time that we stop pretending that reality is divided into bureaucratic pigeonholes.

We have an example here in California. Occidental Chemical Co. was tragically aware of the damages caused by DBCP no later than July of 1977, when it was discovered that their manufacturing workers were sterile from using DBCP. Yet Oxy did nothing to test the effects of its products on pesticide applicators. Taxpayers paid for that through the Center for Disease Control and other agencies.

Oxy continued to fraudulently conceal its discharge of DBCP into well water. We believe that a comprehensive bill should treat a company's total history with regard to toxic substances as a whole, assessing greater penalties where this kind of irresponsibility is shown.

We agree with the Carter administration's proposal that strict liability should be the standard in seeking recovery of damages from those who contribute to or cause a spill or abandoned site hazard. We applaud that proposal's provision for holding former as well as current dump owners responsible when both helped cause the hazard.

But we urge some further practical measures. First, the bill should provide for piercing the corporate veil of undercapitalized corporations to establish individual liability of officers and directors.

Second, the liability should not be dischargeable in bankruptcy.

Third, we believe the Internal Revenue Code should be amended to prohibit listing such payments as business expenses, especially where the violation was willful.

Fourth, we have recently stepped up criminal prosecutions of occupational health violations for those who assault us with slow acting poisons as well as those who commit other types of assaults. We recommend that adequate criminal penalties for willful violators also be enacted.

With regard to damages, the recent proposal of the Carter administration is its weakest. Indeed, the proposed act is weaker than any bill proposed in the last few years. It contains neither compensation nor rights of action for property damage caused by abandoned dumps or damages to natural resources, except for some minimal exceptions.

These damages should be included. It is only just that companies pay fully for damages they cause. It seems ironic to pay for containment of wastes remaining in the dump site, yet deny payment for direct injuries already caused by releases, such as medical expenses and cleanup of contaminated homes and farms.

We think it is especially essential, and we know it is your special interest, to provide for recovery of environmental damages which

otherwise might be difficult to obtain in some courts. These damages should measure the full extent of our societal loss when plants and wildlife are killed and ecosystems disturbed.

We categorically reject the notion that environmental damages can be evaluated only by commercial standards. We think that a flexible rulemaking mechanism to allow administrative assessment of damages such as that contained in your amendment to last session's S. 2900, should be adopted to facilitate damage valuation. Some later State panelists, as you mentioned, will describe our rather successful damage assessment program. We hope and trust these will deserve your consideration.

One thing has not been mentioned with regard to liability and damages in anything we have seen. That is causality. Because of the latency of the chemicals and the difficulty of isolating the chemical cause of one injury, it is often the case that the traditional tort concept of proximate cause is very difficult to realize. Yet there are times when commonsense leads us to believe that when everyone is getting sick around Love Canal, it is that site that caused the injury.

We think it is vital that this bill attack that problem in two ways. First, we urge substantial research. Second, we urge the inclusion of a provision in the bill that reflects a commonsense approach to causality which enables injured parties to receive compensation for their injuries, according to State tort law, so long as a reasonable person would conclude that the relationship between a release and the injury is more probable than not, based on such evidence as a higher statistical incidence of such injuries around the site.

This bill should also assure that information received by Federal authorities regarding toxic incidents shall be forwarded immediately to responsible State agencies.

Back in March or earlier our water board asked the Securities and Exchange Commission for any information about Occidental Chemical Co. They refused. We think that this kind of behavior is unthinkable. Yet it prevails quite often in our relationships with Federal agencies, either because of redtape or because of asserted trade secrets which would not allow sharing even with responsible State enforcement agencies that will keep those secrets confidential, except for enforcement purposes.

Senator CHAFFEE. You lost me on that one. What would the SEC have to do with Occidental's knowing about—forget Occidental—with company A's knowledge that they were discharging or that their wastes were hazardous?

Mr. WEINER. In this particular case, Senator, Oxy was trying to take over another company, Mead Fertilizer. I gather that the people from Mead objected to it, did a little research, and that the SEC eventually came into possession of documents which show that Occidental was aware of its illegal discharge of DBCP and other pesticides into well water. I gather that through the advocates at Mead we became aware that some such documents might be available, although Mead did not have them.

We therefore asked the SEC to provide us with anything they had that would be relevant to that discharge. We are not saying that they usually would know about such a thing. It is clear,

however, that they realized the value and importance of that information, or it would not have been provided to a House committee which later brought it out in congressional hearings which Dr. Collins attended.

We are only saying that certainly an agency such as EPA, which should have that knowledge, should forward it. Other agencies, if they realize the importance of what they have, should also forward it. I am only saying that we asked for it and that it was refused to us.

Senator CHAFEE. Thank you.

Mr. WEINER. Also, when we do ask for information from EPA, it is often refused because, under many of our environmental statutes, the trade secret provisions have been asserted as a barrier even to sharing with States that have their own security provisions to keep confidential information continually confidential. I am asking, just as we have some relief from those provisions in TSCA and FRFRA, that those barriers to sharing with the States be eliminated so we can have better enforcement.

In terms of providing funds for these purposes, we agree a that large fund at the Federal level is needed to assure a dependable source before we are able to ascertain and convict guilty parties and get them to pay for it.

We agree that the source of this fund should be fees paid by the producers and primary users of hazardous substances. But it would be unfair to provide these funds in any part from general tax funds, as the administration proposal would do. Products made from these substances should reflect their true costs, perhaps leading to economic substitutes made from safer materials.

Finally, we would urge provisions to assure financial responsibility on the part of producers, transporters and disposal operators. We have such a law to assure responsible site closure. We think that firms might be required to carry insurance for some degree of third party liability, such as medical expenses, property damage or income loss.

We have, we think, pretty good programs in California. We want help, but not the obliteration of our existing and effective programs. Preemption, as proposed by the Carter administration, would seriously impede our enforcement efforts for years, while a duplicative Federal bureaucracy becomes operational. Preemption could, if the liability provisions are worse than ours, leave us worse off than now. We strongly recommend no preemption be attempted so long as they provide equal or greater protection for humans and the environment.

Finally, while we look forward to the passage and implementation of this landmark legislation, we know that this is an era of limits for Government. Recognizing these limits, we urge private citizens be granted an express right of action to enforce the liability provision of this bill.

Senator, thank you for the opportunity to testify before you. Our other panelists will now provide a description of our other programs. We stand ready here to assist you and the committee in the months ahead because the passage of these types of provisions is in all our interests.

Senator CHAFEE. Thank you, Mr. Weiner. I think that is excellent. Also, I do commend to the rest of the witnesses, if they could follow Mr. Weiner's model here in which he has a statement in some detail, but which he abstracted from in his presentation, which made it very, very helpful. I can go back, or we in the committee can go back and review in detail what he wrote in the statement.

I would just like to touch on the preemption problem. Of course, that is constantly a difficult situation for us in the Congress because we set up a law which we think is going to handle the situation and then the various States have laws of their own to start with, or some of them come in with laws afterwards that are more strict. Obviously we get complaints from the transporters or from those who are operating the sites saying, "Look, we will abide by a law, but please don't have 50 different laws."

You came out very strongly against the preemption, making your point that you could well have the situation, as you mentioned, that Federal law wouldn't be as strong as your State laws, so thus your citizens have lost. They are worse off, as you mentioned, than they were before.

What would you do about separate fees? Suppose we have one type of fee system in the Federal setup. This is where you get into the preemption problems.

Mr. WEINER. The fee structure is certainly separate from liability and compensation provisions, and the fee structure perhaps provides a more difficult problem. We do not have a fund or fees setup of the type that would cover emergency spills in legislation that we understand will be proposed. If the fund were substantial enough, we would have no reason to enact our own such fees and fund.

Under those circumstances, I must admit we are in a different situation here than you have on the east coast. The distance between San Francisco and Los Angeles in one State covers four or five States on the east coast. So perhaps I am not as sensitive as I could be to those problems.

But we do not believe that those kinds of fee structures, even if separately enacted, would lead to such a great disadvantage to industry or create such an impossible burden on industry as to be unworkable.

Furthermore, halfway houses could be effected in the Federal legislation which allowed for setoffs, for payments to State funds or some other structure that made sure that State fees did not get too out of line. It is not an impossible situation, but we face a lot of steps before such a fund is enacted on the Federal level. We don't know what it would look like, but we are very concerned it wouldn't be sufficient to meet our problems.

Senator CHAFEE. Why don't I hold my specific questions on that. Who is next? Miss Bard?

STATEMENT OF CARLA M. BARD

Ms. BARD. Thank you, Senator Chafee. I have with me from our staff Andrew Sawyer who is an attorney with our legal division who has some expertise in the liability and assessment of damages to natural resources areas. And we have Harold Singer who is an

engineer from the San Francisco regional board, if you have any technical questions, Senator.

Senator CHAFEE. Fine.

Ms. BARD. The State water resources control board and nine regional water quality control boards carry out the water pollution control laws of California. For the most part, these laws parallel the Federal water pollution control program, and in effect, California runs both the State and Federal program.

One of the great needs that exists in California, and which may well exist in other parts of the country that you have been visiting, is for the siting of new class I dumps. Under California law, this is the only place where hazardous wastes can be legally deposited. We only have 11 in California, and their life expectancy is not judged to be much more than 40 years at the most for some, given an optimistic point of view, and far less than that for some in the southern California area.

Meanwhile, it is impossible to find new ones that are publicly acceptable. No one will have one near his or her home, as you no doubt have heard before. It may be the California Legislature will have to give authority for class I siting to the State. This has not been done yet in California, but it may have to be in the future. It may also be necessary for the Federal Government to change its policy of no class I—

Senator CHAFEE. Now is the authority is the counties?

Ms. BARD. That is correct; and with the State board to some extent, and with the health department in the permit procedure. Siting is also done through the county board of supervisors.

But we also feel that perhaps the Federal Government may need to change its policy which has no class I sites of the Forest Service or the Bureau of Land Management lands.

As you may know, about 40 percent of the total land area in California is under those two divisions. So this may be something that your committee may wish to examine as a possibility.

There is no way for any regulatory agency to give a clean bill of health to any area in this country, as you probably know, as far as hazardous wastes. I feel, and the State board agrees, that we need to do survey in California to identify abandoned hazardous waste sites.

It would be an expensive program and would require a program of management that would run concurrently with it.

Parts of a system to handle hazardous waste exist in California, but I would like to mention briefly a few improvements that can be made and use some examples of hazardous waste problems that we have had here in California recently.

The first one is the Stringfellow Dump which is in San Bernardino County, in Riverside. It was an industrial dump that operated for about 25 years. During that time, approximately 32 million gallons of acids, heavy metals and other wastes were deposited there. It eventually was closed after complaints from the neighbors.

Mr. Stringfellow, the owner of the Stringfellow Corp. which ran the dump, was not able to seal the pits, chose not to take adequate measures to do that, and went through bankruptcy. I think Mr. Weiner touched on this point, that bankruptcy may very often be

cost effective for hazardous waste operators rather than going through the closure procedures.

The State and regional boards requested the legislature in 1978 to assist in this, and the legislature finally appropriated funds and authorized closure and maintenance of the site by the Santa Ana Regional Water Control Board, which is presently doing that. This will be an almost permanent problem because work must be done there during every rainy season to prevent overflows of those acid pits. That is being done by the regional board at great expense.

For the long run, the law in California established a site closure and maintenance fund derived from fees paid by operators and owners. They are also required to file closure plans, including how closure will be financed. Reserve funds or bonds may be required of them for this process.

I think the Stringfellow thing points out the desirability of a quickly available funding source for solving past problems. As you probably know, these things suddenly seem to spring upon us in the middle of the night. One day we do not know about it and the next day we are faced with an enormously expensive problem.

In California, it is true to say that in some cases a litterbug faces stiffer penalties than a hazardous waste site operator who turns his back on a major pollution problem.

Another area causing difficulties to California is the matter of the abandoned mines. An example is the New Penn Copper Mine operated on the Mokelumne River, next to what is now Lake Camanche, a reservoir for the East Bay Municipal Utility District in the San Francisco area.

The regional board inspected the area and found rainwater runoff going through the copper sulfate—

Senator CHAFEE. I wonder if we might interrupt 1 minute here. We are in a quandry. We are always anxious to get greater public acceptance of our problems. The TV station is anxious to hear about this. So we are torn.

I think we might yield to that omnipresent public opinion mode of the television. What do they want?

Mr. MOORE. They want us to do what you just did, I think. They want you to break and they want to ask you what, if anything, can be done.

Senator CHAFEE. I think since it all advances the cause we are all interested in, we might yield to them this once. Would you excuse us 1 minute, Miss Bard? I can assure you this has nothing to do with my political future. I am not running in California.

[Brief recess.]

Senator CHAFEE. Thank you very much. Miss Bard, we appreciate your suffering the interruption. You go right ahead. You were just starting on the mines.

Ms. BARD. Yes. I think I will back up and repeat a phrase I am rather fond of.

Senator CHAFEE. We are all guilty of that.

Ms. BARD. I was horrified that a litterbug in California faces stiffer penalties than a hazardous waste site operator who turns his back on a major pollution problem.

Senator CHAFEE. I spotted that. I thought that was pretty good myself. I thought I might plagiarize.

Ms. BARD. Please feel free.

Senator CHAFEE. And give credit?

Ms. BARD. That is not necessary.

Abandoned mines. I spoke briefly before about the New Penn Copper Mine on the Mokelumne River, which is right adjacent to the drinking water reservoir.

In this case the regional board from region II in Sacramento found rainwater runoff through the copper sulfate mine tailings, leaching heavy metals and sulfuric acid into the reservoir. Before the leachate could cause a major problem, however, the regional board, East Bay Municipal Utility District, and the California Conservation Corps cooperated—the East Bay District put up a great deal of money—to dredge wastes and divert runoff to evaporation ponds.

This is a success story of interagency cooperation, which is something we believe in very firmly in California. However, the tailings remain and so does the need for constant checking to make sure diversion trenches are working.

The same regional board has identified 40 inactive or abandoned mines, some of which are polluting surface waters.

Control measures will be costly. The poisons are formed by the interaction of air, metallic sulfides and rainwater. Controlling rainwater runoff is the chief method of control, along with sealing off holes, fracture zones and tailings.

As Mr. Weiner said so eloquently, it is cheaper for the owner if he abandons the property. I think this is where legislation needs to have a much heavier thrust. The two magic ingredients required to absolve the sins of the past are money and strict liability.

Senator CHAFEE. Let me just interrupt a minute. Mr. Weiner really said somewhat the same thing about money and strict liability. But in my judgment, that is not going to absolve the sins of the past.

In these areas we have a whole mass of unknowns which have truly disappeared. We can pierce all kinds of corporate veils and we won't find anything there.

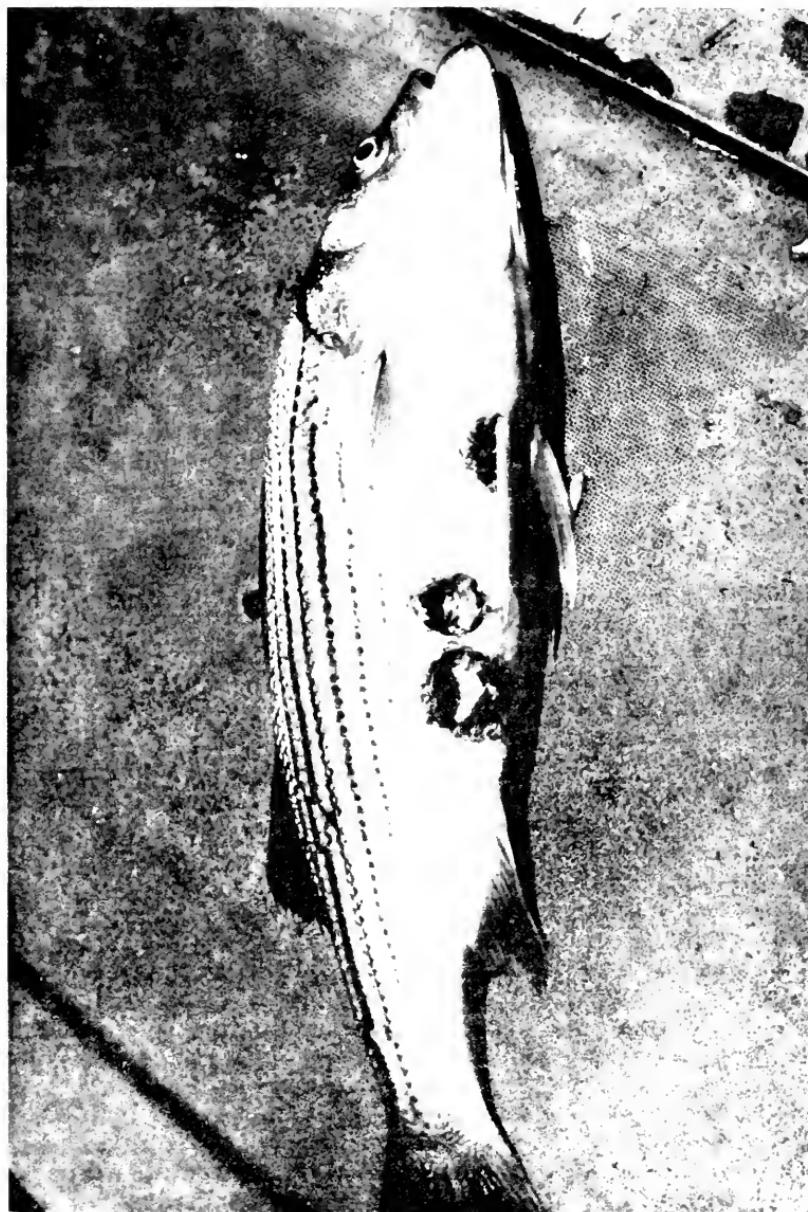
Ms. BARD. I think what I had in mind, Senator, was the money would pay for cleaning up that which we do find in that particular instance. That is what I had in mind.

Senator CHAFEE. Strict liability is not going to help us very much there.

Ms. BARD. No, but strict liability could help prevent future problems. We also have cases where a large mining company sells a mine to someone who can't afford to correct the problem. The sale should not allow the mining company to escape liability.

I have here a photograph you might be interested in seeing. This is for the record. I am submitting a photograph taken recently of striped bass from the San Francisco Bay. I am sure you will share my dismay when you realize that the holes that appear in these fish are a new phenomenon and appear to be becoming more frequent. Though heavy metals and organics have been found in these and other striped bass, we do not now have all the information that allows us to point the finger of blame at any one particular cause or any particular solution.

We do know that yearly there is a striped bass fish kill in the San Francisco Bay and the Delta, at the point where saltwater meets freshwater. We also have strong evidence that the striped bass fishery suffers from parasites, deformities and open wounds.
[The photograph referred to follows:]



Ms. BARD. I bring this up in relation to hazardous wastes because there are two issues that the striped bass situation raises. You touched on it in your opening remarks.

First of all, we lack knowledge of toxics, what they do, where they go and how they interact with each other to such an extent that Government decisionmaking about hazardous materials is an intellectual dice game.

Second, there is evidence that levels of pollution below what we designate as toxic can have serious long-term effects, especially when combined with other forms of pollution and water quality problems.

Money is the root of all solutions, and money for basic research into the synergistic effects of hazardous materials in the environment is needed.

I won't dwell on Occidental Chemical Co. because I think Mr. Weiner covered that adequately. However, the memos that he made reference to that the SEC finally made available to us through the public press show that officials knew what they were doing and they did not report this to the regional board. Dr. Harvey Collins was the one, as Mr. Weiner said, who brought those memos back to the State water resources control board.

It points up two things. Mr. Weiner mentioned the need for interagency cooperation within the confines of the disclosure of confidential information. We also need more inspectors at the regional board level to prevent this type of case from recurring. We need criminal penalties for flagrant misuse of hazardous materials as a necessary deterrent to corporate irresponsibility. They would be a measure of the seriousness with which we view this problem, and they would herald a major change in attitude towards those who deliberately pollute our world.

I thank you for the opportunity to appear here today. Hazardous wastes are treated in the law with little more concern than other types of discharge, but they are unique in the dangers they pose and in the low concentrations that breed long-term, chronic effects. It will be expensive to fix these problems. It should be a lesson to us. We must control hazardous materials at the source by holding those who use them strictly accountable for their actions and to encourage them to do recycling of hazardous materials in order to prevent them from entering into the environment in the first place.

It should no longer be cost effective for a mineowner or hazardous dump site operator to turn his back on the problem. If that is done, I think you will have set the context for corporate responsibility that will lead to significant improvements in how we deal with hazardous wastes.

Thank you very much.

Senator CHAFEE. Thank you very much, Ms. Bard. Those are good points you have raised.

Ms. BARD. I have some more information that we could send to your committee by post, if you would like.

Senator CHAFEE. All right.

I had an opportunity this morning to become somewhat familiar with the class I site problem and the delays that come up with

that, as you mentioned. Everybody wants very stern, vigorous measures to be taken, as long as they are not taken near them.

Ms. BARD. That is true.

Senator CHAFEE. I don't know what the State of California is doing to wrestle with this problem as far as getting it away from county control.

Ms. BARD. At the moment, Senator, I don't believe the State is acting on this problem. I think Dr. Collins could address that a little bit more adequately than I. But at the moment I know of nothing that is being done in that regard.

Senator CHAFEE. That, of course, always gets into a very, very touchy political problem—

Ms. BARD. Indeed.

Senator CHAFEE [continuing]. Of ramming it down the throats of some county.

Ms. BARD. Precisely.

Senator CHAFEE. Asking a question of Mr. Weiner, he suggested that bankruptcy not be permitted as a defense. I was thinking how often we do that. I think we did that in connection with the student loan program, in which bankruptcy is no longer a defense against his obligations under a student loan.

Mr. WEINER. Yes.

Senator CHAFEE. Can you think of any other instances where that has been done?

The question dealt with Mr. Weiner's proposal that bankruptcy not be a defense. I was trying to think of examples where bankruptcy has not been permitted to be the defense, like in the student loan program. Are there others?

Mr. WEINER. Senator, although I am a lawyer by training, I am not a bankruptcy expert. But if I remember correctly, persons who cause injury with malice cannot discharge their resulting obligations through bankruptcy. I would put people who operate disposal sites in the position of someone who knows the kinds of problems they may create and should be held strictly liable for anything that is caused.

If they are not adequately funded in terms of insurance or other reserves to pay for the damages they may cause, I am saying that they are causing that damage by their inability to pay with malice, so that the debt should not be dischargeable in bankruptcy.

Senator CHAFEE. That may be a double jump you have made.

Of course, you always have the worry in this business that you make the liability so onerous that nobody enters the business. Somehow we have to encourage responsible operators to undertake this field which by its very nature opens one to all kinds of criticisms.

Then I am thinking of you get small, on-shore facilities. You have over here some operator who is providing diesel fuel or gasoline for small boats, pleasure boats. You put him under all kinds of liability such as that. He can't get the insurance like Shell or Standard Oil can.

Mr. WEINER. Senator, I did not mean to imply those kinds of strict provisions should be applicable to everyone. I perhaps mispoke if I did so imply. But mainly for willful violators and perhaps

within the fabric of a structure which requires insurance or other financial responsibility to be shown before a dump is started.

If we put it in that kind of a context, where we have a compulsory insurance mechanism, then truly the person who operates without insurance or lets his insurance get cancelled or expired should be held liable for that kind of activity. But I agree with you that we don't want to create a situation where no one will enter the business.

Senator CHAFEE. Now if we might hear from Dr. Collins.

STATEMENT OF HARVEY F. COLLINS

Mr. COLLINS. Thank you, Senator. I am Harvey F. Collins. I am the acting chief of the department of health services, hazardous materials management section. Accordingly, my testimony will be limited from a health perspective rather than the total State program which you have already heard parts of.

In the department of health services we have had a law that mandated the department to govern hazardous wastes management since about 1972. I might quote the highlights of that law for you.

We are charged with developing criteria and listing chemicals that are to be regulated pursuant to that law. We have had a manifest system in California for many years where every load of hazardous waste that is transported is to be accompanied by a manifest listing the origin of those wastes, the constituents therein, and the destination.

We have a unique system in California that is not mandated by Federal law that requires every hauler of hazardous waste to be registered with the department. They are issued a sticker to be placed on the vehicle identifying that truck and that hauler as a registered hauler with the department of health services.

We have a permit program similar to RCRA that requires every facility, both offsite as well as on private property, that handles, stores, treats or disposes of hazardous waste to have a permit from the state.

We also require that for any extremely hazardous waste the disposer must obtain a permit from the department prior to disposal. And we may require special precautions. We may want a chemist on site to inspect any disposal of these types of wastes.

We have field surveillance and enforcement teams that try to inspect and enforce the various provisions of the law. Our initial law was inadequate as far as penalties go, but more current amendments now provide civil and criminal penalties of up to \$25,000 per day of violation and up to 1 year's imprisonment, again the same as mandated by RCRA.

Senator CHAFEE. Has anybody been punished under these laws?

Mr. COLLINS. Not under the \$25,000 law, sir. The amendment is fairly new. We have several cases pending. We prosecuted under the old law. The maximum fine we could obtain was \$500.

Another provision of the California law is that we are to encourage the resource recovery of those wastes that are amenable to being recovered. The California program, although it has been in existence for several years, does have numerous problems, some of which you have already heard about.

The establishment of new facilities. The thought there was what are we doing to preempt the local jurisdictions. Right now it would require legislation because the county planning commission first has to grant a land use permit at the local level. Subsequently, a proposed discharger would get discharge requirements from the regional water quality control boards and a hazardous waste disposal permit from the department of health. So the local authorities can prevent the establishment of a site.

The department of health services has a hazardous waste technical advisory committee made up of public and private persons. We had a meeting scheduled today in Concord which we postponed because of the conflict with this particular hearing.

The irony is that one of the subject matters of that public meeting is what should the State be doing in regard to obtaining additional sites; there the thought was that we might propose legislation that would take care of the problem.

Senator CHAFEE. You mean have the States issue the permits?

Mr. COLLINS. That is a possibility. The reaction at the local level is mixed.

Senator CHAFEE. Mixed. I am surprised it is mixed. I thought it would be uniform.

Mr. COLLINS. No, sir. I believe some local authorities feel the issue is so controversial they would just as soon the State handle it. That is in hopes, no doubt, the site will be other than in their territory.

But anyway, the State is cognizant of the problem, and we are trying to obtain more information before we recommend specific action.

Senator CHAFEE. Under the current law, if indeed the applicant for the class I site has met all the requirements of class I, which I understand deal with the density of the soil and a whole variety of factors such as that, can the license be denied? I suppose there is a discretionary element in there that everything is perfect, except it is too close to the neighbors who are a mile away.

Mr. COLLINS. If the local land use authority does not grant the land use permit for the use of that land for that specific purpose, then that site cannot be legally established in California.

Senator CHAFEE. I mean there is no appeal.

Mr. COLLINS. I believe the local planning commission will make the decision. That can be appealed to the county board of supervisors. But as I understand it, the buck stops there.

Other problems we have had involve the management of uncontrolled hazardous waste sites. You have already heard about that so I won't pursue that further.

Prevention of illegal disposal of hazardous wastes. We have a law. There is now teeth in that law. Again, are there ever enough cops? We find ourselves even staking out sites at night in efforts of trying to apprehend people that would try to avoid the high cost of disposal at class I sites. There are always ways to try to avoid the limited inspectors that even all the State agencies combined could muster.

Management of small quantities of hazardous wastes dispersed among many sources. They can find their way into regular solid

waste refuse containers. How does one prove who put a small hazardous waste container in that solid waste bin?

Dependence on disposal of hazardous wastes by land burial. Certainly we have heard from many persons throughout the past years that there ought to be a better way—like treating and reclaiming. That is certainly the way California wants to go. We are certainly looking at alternatives to land disposal. The administration and the various State agencies in Sacramento are meeting regularly trying to define how we can go about obtaining better alternatives.

The last item Mr. Weiner already mentioned briefly is the need for a comprehensive monitoring program to determine the effects of hazardous wastes on human health. I will discuss that just a little bit more further on.

I won't get into the number of incidents that we have documented in California—some deliberate, some accidental. Some of these are in the attachment that I have provided. I can provide the committee with additional incidents at a later time.

I mentioned health protection being the basis of our program within the Department of Health. We feel even at this time woefully inadequate in trying to predict the long-term effects of chemicals on human health. Most of the expertise within the epidemiological profession has dealt with the classic disease, the virus, the bacterial pathogens. And there are few experts that have expertise in determining the impact of chemicals on human health.

We find that we are identifying such a need in California. We hope to be able to better answer some of the unknowns that we are encountering.

Certainly it would require a team of medical doctors, toxicologists, epidemiologists—the whole spectrum of health professions.

In closing, the last major issue I would like to discuss is the need to search out these abandoned sites, Senator, that you mentioned. We, too, concur with that need, and again in California we are actively planning such a study. We don't anticipate that we will find major Love Canals because the regional water quality control boards we feel have done an excellent job over the past 40 years. But we feel there are numerous small sites perhaps on the back 40 on private property.

Our inspectors are already identifying those small disposal sites and ordering cleanup. In those cases where the industry is still in existence, they have the funds to clean them up. But in the event that we do identify major problems, such as the Stringfellow site which has been mentioned, then certainly the super fund would help meet the need of identifying what is there and seeking cleanup.

We realize that until such a super fund becomes available, though, that we may be in dire need of funding. Because of that, we support that interim funds be made available. These interim funds have been requested by EPA in a 1980 budget amendment. We feel that with that amendment those funds could help meet the interim need.

That concludes my remarks, Senator. Thank you for the opportunity to appear before you.

[Subsequent to the hearing, the following was received from Mr. Collins:]

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

EDMUND G. BROWN JR., Governor

DEPARTMENT OF HEALTH SERVICES
714/744 P STREET
SACRAMENTO, CA 95814
(916) 322-2337

August 6, 1979



Aug 9
Honorable John H. Chafee
The United States Senate
Committee on Environment and Public Works
Washington, D.C. 20510

Dear Senator Chafee:

At the recent Committee hearing in San Francisco on problems associated with toxic pollution, I was concerned with the accuracy of some of the information which was provided to the Committee with regard to the management of waste drilling muds in California. Pursuant to the recommendation of Mr. Cummings of the Committee staff, I would like to provide you with the following information which clarifies and expands upon the information presented by Mr. Ivan Gilman, General Manager of Environmental Affairs, Chevron, USA.

At the hearing, Mr. Gilman inferred that all drilling muds are nonhazardous because studies by the California Department of Fish and Game, the South Coast Water Resources Research Project, and the Gulf Universities Research Consortium have shown little environmental impact associated with certain non-oil-based muds. He also stated that drilling mud waste is classified as hazardous in California and, accordingly, all disposal is restricted to Class I disposal sites.

These statements are inaccurate and tend to simplify a complex waste management and regulation problem. There is no single type of "drilling mud". Waste drilling muds resulting from petroleum or gas well development are comprised of mixtures of cuttings of the earth's crust, the chemical formulations which are added to facilitate the drilling process, and the liquid carrier. There are literally hundreds of different commercial chemical drilling formulations available on the market.

Many drilling formulation manufacturers consider their product's chemical compositions to be trade secret information, which further adds to the complexity of the waste management problem.

The chemical compositions and the functions of the formulations vary tremendously. The chemicals used will depend on the type of well being drilled, type of strata encountered, lubrication requirements, and drilling depth. Examples of specific toxic chemicals that are often added include but are not limited to the following: (1) chromium salts, (2) alkalies, (3) acrolein, (4) chlorinated phenols, (5) amines (6) petroleum sulfates, (7) alcohols, (8) paraformaldehyde, (9) alcohol ether sulfates, and (10) tri-aryl phosphates.

These toxic additives, if they exist at sufficiently high concentrations in the discarded muds, may pose a health and environmental hazard if not properly managed. To date, we have had little success in obtaining, from

oil producing firms, the names and concentrations of chemical additives in specific drilling mud wastes as delivered to disposal sites.

In recognition of the wide possible variability in the potential toxic hazards posed by drilling muds, the Department, contrary to Mr. Gilman's statement, has refrained from calling all drilling muds hazardous. Our approach has been to classify a drilling mud as hazardous if the drilling firm producing it has added any toxic chemical to the well during the associated drilling process.

Only a very small percentage of drilling muds are disposed of in Class I disposal sites in California. Most of these wastes go to 30-40 Class II-1 disposal sites which have been established specifically to accept oil production wastes. Class II-1 disposal sites are sites which do not have the natural geological conditions required for a full Class I chemical disposal site. However, with the installation of certain man-made barriers such as liners, keys, and berms to prevent migration of wastes to groundwater, these sites are allowed to accept restricted types of hazardous wastes such as drilling muds. Many of these sites are operated by gas and oil-producing firms on the oil fields. Additionally, Class II-1 disposal sites may often accept utility scrubber sludges, spent cracking catalysts, spent oil shale, and other low hazard oil production wastes.

Classification of muds containing toxic chemicals as hazardous by the Department does not divert these oil-production wastes from Class II-1 sites presently accepting them to Class I chemical sites. Our regulations, instead, require proper handling, record keeping, and other predisposal management of the wastes so as to protect public health, wildlife, livestock, and the environment.

In conclusion, California, with the combined programs of the California Department of Health Services and State Water Resources Control Board, has implemented a rational and workable method of dealing with the less hazardous, high volume wastes through use of Class II-1 disposal sites. The State's 11 full Class I sites are, in general, reserved for the more dangerous chemical wastes.

If you have any questions, please feel free to contact me at this office.

Sincerely,

Harvey F. Collins
Harvey F. Collins, Ph.D.
Acting Chief
Hazardous Materials Management Section

cc: Ivan Gilman
Chevron U.S.A.
555 Market Street
San Francisco, CA 94103

Western Oil and Gas Association
727 West Seventh Street
Los Angeles, CA 90017

Senator CHAFEE. Mr. Weiner, I thought, testified that he did not want public funds involved. You weren't opposed to public funds in the cleanup, I take it. But you thought this is solely a private liability.

Mr. WEINER. Senator, I think the difference is only in that Dr. Collins was mentioning an interim budget appropriation which we would support on this emergency kind of basis. We think it is urgently needed.

But in terms of the structuring of an ongoing fund, the administration proposal called for a \$500 million fund—\$100 million of which would continue to be appropriated each year, rather than coming from the fee structure.

We would prefer to see the entire amount come from a fee structure when that fund is eventually established.

Senator CHAFEE. Fine.

Now Dr. Gordon.

STATEMENT OF ALVIN GORDON

Mr. GORDON. Good afternoon, Senator Chafee.

Senator CHAFEE. Thank you very much, Dr. Collins.

Good afternoon, Dr. Gordon.

Mr. GORDON. For the record, my name is Alvin Gordon. I am a member of the California Air Resources Board. I indeed appreciate the opportunity to appear here before you this afternoon along with representatives of our sister agencies to provide you with my agency's views on the relationships between the air, environment and the hazardous waste disposals.

Senator CHAFEE. Perhaps you could speak a little louder.

Mr. GORDON. I am always accused of that at board meetings. I will try.

Senator CHAFEE. You are going to extrapolate from your 24-page statement?

Mr. GORDON. That is right.

Senator CHAFEE. Fine.

Mr. GORDON. I have cut down quite a lot from what I have submitted.

I will give my agency's views on the relationships between the air environment and hazardous waste disposal and the larger and perhaps more important question of toxic substances in the air environment.

With respect to hazardous waste disposal, our primary concern is the release of volatile vapors and finely divided dusts into the atmosphere—that is where our responsibility is—as a result of improper operation of both class I disposal sites and the more common landfill disposal sites.

I would like to give you a well-documented example which occurred in the early seventies. There were a number of complaints of unpleasant odors from a class I disposal site and the Air Resources Board and State Health Department investigated it. I commend to you this was a joint effort.

Senator CHAFEE. How many class I sites are there in California, would you say? Eleven did someone say?

Mr. GORDON. That is right. It looks like we are going to have trouble getting more.

They began a series of measurements in the vicinity of the site across the bay from here in Benicia. It is very close to where we are right now.

Our scientists found that ambient levels of lead in the atmosphere in the vicinity of the site were as high as 135 micrograms per cubic meter of air. This is about 100 times as great as the present EPA standards for lead quantities in the air.

We found, following further investigation, that a number of Bay area oil refineries and petrochemical plants had been transporting wastes—including volatile lead compounds—to holding ponds on the site. The volatile, highly toxic lead compounds in the ponds evaporated into the air of the surrounding community. Of course, we stopped this practice as soon as it was found. But indeed thousands of people were exposed to dangerously high levels. Even now we don't know how much damage might have been done by that kind of an exposure.

Permit me now to turn to a larger question of toxic substances in the air and environment. I want to urge the committee not to overlook a potential problem that may be even more serious. We see waste management as one possibility for air contamination, but there are other possibilities I would like to call to your attention.

Volatile toxic substances are released—sometimes inadvertently, sometimes not—at all stages in the process: during manufacture, during transport via rail, highway and water, and at the point of use, and finally at disposal. We now have underway a survey that will identify the 10 most important carcinogens now used in California, locate the points where these substances may be released into the atmosphere, and measure the amounts being emitted. When the survey is completed, I will assure you that my fellow board members and I will move expeditiously to try to control these substances.

Another approach is in the area of standards setting. Last year the board adopted an ambient air quality standard for vinyl chloride—the first such standard in the Nation for a chemical carcinogen. Within the next few weeks regulations requiring vinyl chloride manufacturers and users to meet this tough standard will be on the books.

I am also submitting for the record, Mr. Chairman, a much more extensive list of initiatives that the Air Resources Board has undertaken with the objective of minimizing community exposure to air-borne toxic substances.

I am optimistic that the Congress, working together with the executive branch, the States and industry, can solve the serious problems we have discussed here today, given a strong commitment to protecting public health as shown by the leadership of your subcommittee. Thank you very much for your attention. I will be pleased, of course, to try to answer any questions that you may have.

Senator CHAFEE. Fine. Thank you.

I must say that we all try to be optimistic, but when you think of the points that Miss Bard raised dealing with the synergistic effect of a series of chemicals, A and B, each being relatively harmless separately, it is going to require all the optimism we can muster.

Mr. GORDON. Quite true. Senator, if we don't maintain our optimism, we just all will give up, and that is not good.

Senator CHAFEE. That is right. We start the long journey by taking the first step.

Mr. GORDON. Right you are.

Senator CHAFEE. Mr. Cowles, from Alaska, a former member of the staff of this committee. That makes him all wise.

Mr. COWLES. I thought you were going to say something else.

Senator CHAFEE. He is now with the Alaska Environmental Agency.

STATEMENT OF DEMING COWLES

Mr. COWLES. I am Deming Cowles, deputy commissioner of the Alaska Department of Environmental Conservation. I appreciate this opportunity to present a summary capsule of our hazardous waste management program.

According to the 1971 enabling legislation of the Department of Environmental Conservation, the environmental policy of the State of Alaska is "to conserve, improve and protect its natural resources and environment and control water, land and air pollution" and to "develop and manage the basic resources of water, land and air to the end that the State may fulfill its responsibility as trustee of the environment for the present and future generations."

As the State agency charged with the responsibility for the "control, prevention and abatement of air, water, or land or subsurface land pollution," the department was given broad-ranging authority over discharges of oil and hazardous substances, environmental planning, State sewerage and water supply systems construction, municipal and industrial waste discharges, state permit coordination, regulation of landfill operations, pesticide application, discharges of radiation and siting of all nuclear-related facilities in the State.

The department is the responsible agent for implementation of the Resource Conservation and Recovery Act, and as such is in the process of developing a solid waste management plan under subtitle (d). One aspect of the plan will be to address the problems of hazardous and toxic waste materials, subtitle (c).

Problems associated with any environmental planning in regard to Alaska are put in focus by a few geographic statistics. Alaska comprises 17 percent of the total U.S. land mass, over 50 percent of the total U.S. coastline, and has over three million lakes larger than 20 acres in size. Minnesota has 10,000. Approximately 40 percent of the total U.S. freshwater runoff occurs in Alaska.

While vast in size, Alaska's population comprises only 0.2 percent of the total U.S. population with 50 percent of that in the greater Anchorage area, the only city with a population in excess of 50,000. An additional 30 percent live in the remaining seven cities with a population in excess of 4,000. Large areas of Alaska's land mass consist of mountains surrounded by wet tundra covering near surface permafrost.

Senator CULVER. In Alaska, if a community is over 4,000 it is called a city?

Mr. COWLES. Yes, sir. That is a big town.

In other areas of the State, extremely shallow soils and steep slopes present additional problems with the use of land for disposal of pollutants.

Under Alaska's solid waste management regulations the department has broad authority to regulate the disposition of hazardous and toxic wastes. Hazardous wastes are defined as those substances "capable of causing injury, disease or impairment of health, or property damage, including, but not limited to, poisons, pesticides, acids, explosive materials, and oil and petroleum products."

Alaska is not heavily industrial and, as such, is not a major generator of hazardous substances, with the exception of oil in the form of crude and petroleum liquids. Currently there is only one approved landfill site for hazardous disposal.

We have essentially five identifiable categories of hazardous substances in the State. We require infectious pathological wastes to be incinerated prior to disposal of ash. Waste oils are collected for use in road dust control under permit by our department, reinjected into subsurface strata under permit by our department, for heat generation for enhancement of the Btu value of coal in one Alaska coal mine, for shipment out of the State for re-refining, or burned in waste oil burners. However, waste oil still represents a major waste disposal problem.

Perhaps the greatest quantity of industrial pollutants is generated from the oil industry in the form of drilling muds and produced brines. Those substances are not currently subject, I hope, to RCRA regulations. Produced brines and waste oils are generally reinjected on the North Slope and in some areas of the Cook Inlet. Drilling muds are disposed of in drilling pits on the North Slope, with the location recorded with the State Oil and Gas Conservation Commission.

The hazardous waste disposal facility in Sterling, Alaska, is used for the disposal of oil-based drilling muds from the Cook Inlet production fields.

State policy fairly severely limits the use of pesticides in the State for public purposes. Where spraying is allowed by our department, type, location and method of spraying are stringently regulated. Disposal of empty cannisters is in accordance with Federal pesticide legislation.

Alaska does have an incipient refining industry, chemical production industry, and a major ballast water treating facility. The Alaska water quality standards were recently revised to impose perhaps the most stringent aromatic hydrocarbon and total hydrocarbon restrictions in the Nation in order to protect against the disposal of benzene, toluene, xylene, and other similar hazardous hydrocarbon substances.

Senator CHAFEE. Mr. Cowles, perhaps you could summarize a bit of this. We are running behind. We got off to a fine start and we are behind schedule now.

Mr. COWLES. I won't ask for equal time with California. I will just summarize.

It is true that our information about the occurrence of hazardous and toxic substances is a combination of current permitting and management practices and not the result of a detailed inventory or study.

While the State lauds the goals and objectives of the Resource Conservation and Recovery Act with regard to hazardous substances, it currently believes that adoption of the subtitle (c) program might well not be cost effective for the State.

Like its western sister States, Alaska prefers to control as much of its destiny as possible with regard to control of its environment. It is not clear that management of the subtitle (c) program would provide as much service to the people of the State of Alaska as would expenditure of a similar amount of time and money on research into resolution of the types of solid waste problems facing Alaska now and in the future.

There is one catch-2 aspect of the currently proposed regulations under RCRA. While we strongly believe that financial responsibility should be required for operators of hazardous waste disposal sites, it is not clear that the amount of wastes generated in Alaska will support the costs generated by the provisions for financial responsibility, the trust funds for closure, and the like.

If such facilities cannot be supported by the private sector, the department may well have to contemplate the State ownership or operation of a hazardous waste disposal facility in order to meet projected need. On the other hand, not to require such financial arrangements may result in poor management and insufficient resources to satisfy claims.

I would like to attempt to summarize some aspects of Alaska law which provide some fairly stringent enforcement avenues of action or hazardous spills.

Alaska law does provide for strict liability of the person owning or controlling hazardous substances which enter the waters, surface or subsurface lands of the State in the event of damages to persons or property, whether public or private. Such person is relieved from strict liability only in the event the discharge or release was a result of an act of war, the intentional act or negligent act of a third party other than one in a position of privity or employment, or the event of an act of God or negligence on the part of the U.S. Government or the State of Alaska.

In order to avail himself of relief of strict liability, the owner or controller of the substance must also prove that he discovered the entry of the hazardous substance and began operations to contain and clean up the substance within a reasonable time, except in the case of an act of war.

Damages that are recoverable include, but are not limited to, injury to or loss of persons, real or personal property, loss of income, loss of the means of producing income or the loss of an economic benefit. An economic benefit is measurable in economic terms, including gathering food or other items in a subsistence economy and their replacement cost.

In the event the discharge of hazardous substances, the perpetrator of the spill is liable to the State for natural resources restoration damages. That liability includes an amount equal to "the sum of money required to restock injured land or waters, to replenish a damaged or degraded resource, or to otherwise restore the environment of the State to its condition before the injury."

The State of Alaska recognized the importance of the Alaska environment by adopting a special civil penalties provision for

discharges of oil, including all petroleum products, which I would like to take a minute to try to explain.

Under the civil penalty provisions, the environment is designated as freshwater, marine and public land. Under the general category is a further specific delineation into critical, very sensitive or sensitive environments, and environments without significant resources.

Explanation of critical freshwater environments include: (1) Anadromous rivers and streams; (2) waters and wetlands within national wildlife refuges and their sources; and (3) Alaska designated critical habitat areas, sanctuaries, and fish reserves and their sources.

Sensitive freshwater environments include lakes, freshwater wetlands, and subsurface waters not considered critical.

Similarly for marine environments, marine water within State game refuges, fish and game critical habitats, Federal marine sanctuaries, national wildlife refuge system, 1 mile of the mouth of anadromous waters.

Critical terrestrial environments are State parks, refuges, wilderness and monuments and municipal parks, of which we have a lot.

The regulations grade petroleum and petroleum products and by-products as highly toxic, moderately toxic, less toxic, and relatively nontoxic. For example, gasoline and heating oil are highly toxic. Bunker oil is less toxic, and asphalt is relatively nontoxic.

The regulations then establish a civil penalties matrix by general and specific designations of water and land and set out a factor for degrees of toxicity, degradability, and dispersibility of oil. The net civil penalty is determined by multiplying the set base penalty by the mean of the factors for toxicity, degradability, and dispersibility times the estimated number of gallons.

In the event the spill was caused by the gross negligence or intentional act of the discharger, the penalty is multiplied by a factor of five.

No similar approach currently exists for other hazardous substances. Rather, there exists a general civil action for pollution which provides for penalties ranging from \$500 to \$100,000 reflecting reasonable compensation, to be determined in the court on the basis of toxicity and dispersal of the contaminant and sensitivity of the environment.

The State of Alaska established a coastal protection fund to protect against the discharges of oil-spills, but not other toxic or hazardous substances. That fund was intended primarily to pay for cleanup costs, as well as administrative costs and research and development expenses.

However, third-party damages were not collectable from the \$30 million fund. Unfortunately, this fund, along with the State's major efforts to protect its coastline through control of oil shipping, have been invalidated as the result of litigation brought by the oil industry.

While we have not had sufficient opportunity to review in great detail the administration's proposed ultrafund, this department has endorsed, and has previously testified before this committee concerning, the concept of comprehensive oilspill and hazardous liability funds with certain specific exceptions.

Generally we think that damaged parties should have sure and prompt recourse for all damages resulting from the release of oil or other hazardous substances into the environment.

We would in passing point out that the definition of petroleum should include a definition of LNG. Although cleanup from an LNG facility might be insignificant, or costs of cleanup, damages to real and personal property, as well as natural resources, would not necessarily be.

Further, the degree of recoverable damages is not sufficiently broad to cover all losses of use of real or personal property and loss of use of natural resources. The bill does appear, however, to provide strong incentives to mitigate potential spills and to encourage cooperation in cleanup by the spiller.

I would be glad to answer any questions.

Senator CHAFEE. Thank you very much, Mr. Cowles.

I would just like to ask Mr. Collins a question. This morning we met and saw the facilities that IT has. They are very impressive, what they are attempting to do. They indicated not much enthusiasm for handling dangerous old drums, that that just isn't their line of work. Yet when you recover these sites, you are going to find a lot of drums.

Are you going to have trouble disposing of them? Are people prepared to take them? And particularly because of the synergistic effect that was previously mentioned.

Mr. COLLINS. Senator, we, too, are concerned when one excavates and finds such drums frequently in a deteriorated condition. We are taking the position that one has to first analyze those contents and identify them so you don't mix incompatible wastes together once you finally dispose of them. So they will have to be identified.

They will probably have to be repackaged for safe transportation on the highways. Currently in California the only way one could dispose of them would be in a landfill. It is true the IT site in Martinez would not be equipped for such burial. There are other class I sites in the State where they could be legally handled.

So until such time that the State gets additional technology such as incinerators, our only choice is burial in a class I landfill that is equipped to handle such drums.

Senator CHAFEE. I would like to ask Mr. Cowles about the pre-emption. What are your thoughts on it?

Mr. COWLES. Until the court struck down our fund we had always very much been in favor of allowing States to have funds, particularly for cleanup and particularly for research. We still hold that position, even though we don't have a fund and may not reestablish one.

Senator CHAFEE. Then you get the transporter paying into different funds, with different liabilities. I don't know. I have trouble with that. I am a States rights man, I always thought, but I do have trouble with this preemption business, if the Federal Government is going to get into this thing.

Certainly as far as the funding or the degree of liability, of course as Mr. Weiner pointed out, California might have stricter standards than the Federal Government would adopt. Then the State is going backward.

Mr. COWLES. I think that is the problem. If you can assure us that the fund that is established will allow our citizens to be recompensed promptly without a lot of redtape, and if you can assure us that the liability provisions will be probably stronger than anything we could come up with, and the financial responsibilities the same—but I don't think that that is necessarily the case. We feel that there are enough differences within our State, and probably California has the same situation, that we would feel a little bit better if we could protect our own interests with a little more stringent legislation than the Federal legislation may be.

Mr. WEINER. Senator, if I may say, we would just hope that in your deliberations you would sharply distinguish between the liability provisions and the fund provisions in terms of preemption, because liability is not going to be so different as to cause difficulties for transporters in different States. Basically if they do the right job, they are not going to be liable. If they do something wrong, there may be differing degrees of liability, but they are going to be the kind of technicalities that lawyers make their living off of, not the kinds of things we need to be concerned about or they need to be concerned about in their everyday operations. Differential liabilities will not be more costly to them, will not cause their behavior to change. It is only that fund provision which might conceivably result in some duplication.

Senator CHAFEE. You mean having to pay into a couple of funds.

Mr. WEINER. Yes. If you could imagine everyone charging them up to the neck, it could make them go under. But in terms of differential liability and enforcement, it is not going to be different enough to change any of their behavior, duplication of paperwork, or anything like that.

Senator CHAFEE. You really were getting into damage assessment there, Mr. Cowles, in talking about restoring the natural resource to its original condition. Suppose, and you could well get to a situation where it can't be restored. Where are you then? What happens under your Alaskan proposal?

Mr. COWLES. The Alaskan proposal has been set up to protect against that occurrence by allowing essentially a maximum amount that we could contemplate recovering. In essence we have a provision that says that we have set a fee which is probably the value of a piece of wildlife, a fish, a bird, that sort of thing, and have established that as the basis for recovery. It is very difficult to replace the bird or the fish that died, but you do have an opportunity to restock perhaps or, in the case of an endangered species, hopefully some further mitigation.

But the problem is that you cannot replace an endangered species. We try to get as close to protection and as stringent a regulation as we can to assure the public that we recognize the value of those. But you cannot replace a humpback whale or a bald eagle once it is dead.

Senator CHAFEE. Thank you all very much for coming. We appreciate it. We are particularly glad to have these statements which we will study carefully. Thank you, each of you.

Now we will have the next panel from California: Mr. Dubiel, Mr. Martin, Mr. Walgenbach, and Mr. DeNoville.

Mr. DeNoville, would you like to start? Would that be better for you?

STATEMENTS OF RON DeNOVILLE, GENERAL MANAGER, ENVIRONMENTAL POLLUTION CLAIMS DIVISION, CRAWFORD & CO., VENTURA, CALIF; EDWIN DUBIEL, DEPUTY ATTORNEY GENERAL, DEPARTMENT OF JUSTICE, STATE OF CALIFORNIA; MICHAEL MARTIN, DEPARTMENT OF FISH AND GAME, STATE OF CALIFORNIA; AND FRED WALGENBACH, DEPARTMENT OF FISH AND GAME, STATE OF CALIFORNIA

Mr. DeNoville. Yes, please.

Senator CHAFEE. This panel is going to deal primarily with damage assessment; in other words, how do you figure out what the damages have been and how do you pay for them. Why don't you go ahead.

Mr. DeNoville. We were told to summarize as much as we can, so that is what I am doing.

Senator CHAFEE. Right.

Mr. DeNoville. I am Ron DeNoville, director and general manager of the environmental pollution claims division of Crawford & Co. Crawford & Co. is the second largest adjusting firm in the world.

We have been handling these types of claims. The various claim functions and damage assessment functions which are utilized in oil spill adjusting are very similar to those utilized in hazardous materials spill adjusting. The main difference is that hazardous materials spills create a far larger number of bodily injury claims than those produced from oilspills.

When considering all environmental pollution spills, only a small number of claims for damage to the natural resources are ever pursued after satisfactory cleanup has been completed. It can be stated, therefore, that only a very small percentage of environmental pollution spills require from a claims standpoint the necessity to determine damage to the natural resources.

Normally the plaintiff and the defendant utilize different statistical loss counts and unit price standards to evaluate damage to the natural resources. As the assessment of damage to natural resources is not an exact science, negotiations form a major part of how the final settlement amount is obtained, which in essence is a negotiated compromise.

The environmental pollution adjuster, in order to solve the tremendous problems associated with evaluating damage to the natural resources, must rely on the expert opinions of marine biologists, chemists, statisticians, economists, and professionals in relevant disciplines.

The damage assessment activity is only a small part of the overall activities which are accomplished by the environmental pollution adjuster.

That is a very brief outline.

Senator CHAFEE. Does that complete it?

Mr. DeNoville. Yes.

Senator CHAFEE. You are in a very interesting position because as an adjuster you get between the claimant and the person who is making the payment. What would you think if we had a provision,

as we had in last year's law and will have in this year's law, which provides for fish and wildlife in NOAA and EPA set forth some regulations dealing with the natural resources, marshlands or whatever it might be, as a method of arriving at a judgment as to what the damages to these resources would be from, say, an oil spill or some kind of a hazardous waste? What is your reaction to such a setup as that?

I noted in your statement you said you have had very few claims for damages to natural resources. That may well be because nobody is out there claiming on behalf of the wrecked marshland or whatever it may be.

Mr. DeNOVILLE. One thing is that if the spiller does an excellent job of cleanup and totally cooperates and takes care of the miscellaneous problems that the State agency might have, there is a tendency for a claim not to be filed in the first place and perhaps withdrawn. It seems to work this way.

Most of the small spills, minor spills, do not produce this type of damage claim. Even in the large or major type spills we find that probably less than half of those ever result in damage to the natural environment.

Senator CHAFEE. I am not sure I would agree with you on that. You say half of them don't result in damage to the natural environment. Says who?

Mr. DeNOVILLE. No. I don't mean that it doesn't—what I mean is the damage to the natural resource claim is not pursued.

Senator CHAFEE. Oh. Maybe it is lost in a welter of bureaucratic overlap in which the State, Fish and Wildlife, or Ocean Marine, or whoever it might be, fisheries, neither one knows who to make the claim to so therefore no claim is made. Is that a possibility?

Mr. DeNOVILLE. Yes. I think one of the problems, of course, is if all interested parties could in fact come to a mutual agreement on what standards should be utilized, then standards would be an excellent thing because they would eliminate excessive litigation and allow for more prompt settlement.

Senator CHAFEE. I know that you are not feeling your very best. If you would like to be excused, that is fine.

Mr. DeNOVILLE. Thank you very much.

Senator CHAFEE. We appreciate your taking the trouble to come here today in the adverse circumstances.

Mr. DeNOVILLE. Thank you.

Senator CHAFEE. Thank you.

Why don't you go ahead, Mr. Dubiel.

STATEMENT OF EDWIN J. DUBIEL

Mr. DUBIEL. If I may introduce myself, I am Edwin Dubiel with the attorney general's staff of Los Angeles. I am the attorney who did the work for the Santa Barbara oil spill originally and started the so-called fuzzy flatworm study.

Basically State property consists of personal and land. When we get into land sales, we have a great difficulty in land claims because we have unique lands. An example in the Santa Barbara oil spill was the tidelands in which actually oil was dispersed over an area approximately 175 miles in width and 3 miles in length. We were talking about a class A dump.

Now if the oil companies were required to buy a class A dump in California that was 175 miles in width and 3 miles in length, we would be talking about trillions of dollars, more than beyond their fiscal capability of acquiring.

We have other unique lands of this nature that are in existence, such as sand, that have to be considered in any oil spill plan as far as compensation is concerned.

As far as private property is concerned, we didn't recover for private property, although there were other suits concerned with private property, but we did sue for recovery of personal property. Personal property included wildlife. To determine cost of damage for wildlife we had to go out and we had to check and determine what was actually damaged.

You lost me on the difference between private property and personal property. What does personal property mean in this definition?

Mr. DUBIEL. Personal property would be wildlife. It would be such things like the sand, some of the things that would be normally personal property.

Senator CHAFEE. In my law school they always taught me sand would be real property.

Mr. DUBIEL. It may be, except that it gets transported and it is not a fixture. In other words, it is a hazy thing, so we classified it as personal property, just as we classified firewood as personal property. So we had personal property in that sense. In other words, we classified only actual land as real property. Everything else is personal property.

Now we had difficulties in evaluating our natural resources because in reality it is not very simple operation. You have to determine what was out there first, what was actually lost, and then put an assigned value on it. That sounds very simple, except when you start trying to count fuzzy flatworms and start trying to count fish and other matters. Then it becomes very difficult. Note the Santa Barbara oil spill wildlife cost list submitted herewith.

What this all does is cause a considerable amount of uncertainty. It causes a lot of difficulty, both for the person who spills, for the State, or the claimant. That is one of the problems that we are facing. In other words, when we have a spill of hazardous substances or oil, we go and look at every possible statute that might apply. These statutes, generally speaking, are not really directed to that particular problem. So you consider tort law, conversion, various other laws that may apply and try to adjust the facts to be presented to the court. This causes a lot of confusion, difficulty, and problems in court.

So we are in favor of some type of situation or some type of law which will give more certainty to the claim, which will pay the claim more promptly and make sure that the resource is adequately compensated for.

Now we also have a problem of prevention of spills from occurring for an example. We have a situation on the Mojave River of an oil sludge going underground and affecting water wells causing considerable damage. The spill was caused by a railroad company and a city not actually handling the oil properly over the last 50 years. We actually worked out a solution with these people so that

now they are and will be pumping it back and treating it over years to be able to clear the underground of the sludge.

That is a better solution than securing, we will say, \$1 million, \$20 million, or \$50 million and having an underground water supply polluted.

So sometimes you have to make an exchange. You may not be actually talking about money, but about a remedy to correct a situation.

Now you were saying, why don't we pursue every spill? Basically to be able to evaluate the natural resource damage on a small spill is uneconomical. In other words, if you spill a hundred barrels someplace, by the time the State hires the biologists, all the people to go and look where the spill is, you are maybe expending \$100,000, \$200,000, \$500,000, compared to a recovery of maybe \$5,000, \$10,000, or \$20,000. So you have to look at what you are actually trying to recover.

Many of the spills that occur are small and are not pursued because the proof would be far more expensive than the actual recovery.

Senator CHAFEE. The proof of the damages or the proof of who spilled?

Mr. DUBIEL. No, not who spills too much because usually on some of these spills you can trace the oil reasonably well, but you may have problems of jurisdiction. On a lot of the little spills it is not a question of who spilled but a question of do those 8 or 10 or 20 barrels cause enough damage recovery that you can expend the kind of money to do the adequate study to determine the damage?

So we have to reinvent the wheel each time, every case we go through; on a case-by-case method. Any type of a uniform method of determining the habitat or cost of the resource could be applied would be of great assistance and get more reimbursement than actually what we are getting now. Thank you.

Senator CHAFEE. Thank you. We will come back to some questions.

Senator CHAFEE. Why don't we hear from Mr. Martin now from the department of fish and game of the State of California.

STATEMENT OF MICHAEL MARTIN

Mr. MARTIN. Senator Chafee, for the record, my name is Michael Martin. I am an associate water quality biologist with the California Department of Fish and Game. Your invitation to present testimony on behalf of the department regarding the quantifiability of damages to fish and wildlife resources from hazardous material spills is greatly appreciated.

My testimony today is directed to two subject areas. First, our ability to quantify damages to marine life and related beneficial uses resulting from pollutant discharge or spills. Second, the methods that we have used to establish fisheries values in California.

My testimony is principally drawn from the department's experience in pollution cases and from the literature that I have referenced in my presentation.

Many authors have stressed the difficulty in assessing damages to the natural environment as a result of man's activities. Quantifi-

cation of natural resources values has long eluded natural historians and scientists.

Two questions address the difficulty of assessing and making estimates of pollution damage. The first question is, What damage or loss was caused by the pollutant discharge? The second question is, How can those damages be valued, in an economic sense, in order to determine adequate compensation?

Quantification of ecological damage is limited by the present state of the art in sampling methodology as well as the availability of time, personnel and resources. I and several other authors have concluded that extensive marine ecological studies had not been able to detect sudden changes in species population in hard to study situations like marine environments or lakes.

Sampling error, natural population fluctuation, absence of long-term quantitative background monitoring information, tremendous natural variation in habitat, and other more complicated biological factors create the potential for a margin of error in assessing the amount of harm to a biological community.

The second element of whether pollution damage can be reduced to monetary values has been questioned by a number of authors. The major premise of this question is that because pollution damages may be so large, pervasive and unquantifiable, precise monetary values tend to underestimate the real value of harm to the environment.

In spite of these two elements of uncertainty regarding the assessment and evaluation of damages to fish and wildlife resources, a rational, scientific basis for providing data and conclusions from hazardous substances spill effects is available.

I propose there are two ways of assessing the biological impacts of the discharge of pollutants, which may be referred to as direct methods or indirect evaluation. The direct evaluation would consist of pre- and post-discharge monitoring which would set baseline or unaffected conditions prior to the discharge of pollutants. Such programs are being conducted in California presently both with point-source pollutant marine discharges such as powerplants and municipal sewage treatment plants.

A second type of program referred to in California are the State and Federal mussel watch programs. These programs, funded by the State Water Resources Control Board and Environmental Protection Agency respectively, are designed on a State and nationwide basis to provide a system to document and assess long-term trends in selected pollutant indicators of the quality of coastal marine and estuarine waters. Unfortunately, the present programs are not capable of determining short term and limited impacts, but programs could be designed to do that.

I believe Mr. DuBiel has referred to that in his presentation.

Chemical analysis, field sampling, data processing, and other scientific activities are expensive but necessary to provide reliable data. As an example, an intensive on-site ecological study in a restricted coastal area would cost no less than \$150,000 to \$200,000 on an annual basis.

Senator CHAFFEE. I must say that seems like an awful lot of money for a study like that.

Mr. MARTIN. Natural variation, the complexity of the habitat and the number of personnel and scientific tests that have to be conducted require costly studies.

A second means of assessing damage is the indirect method which is a predictive method or an estimative method. This method uses circumstantial evidence to predict biological effects of pollutants on marine communities.

An estimate of damage can be made based upon knowledge of the biological effects of the pollutant upon representative organisms, knowledge of the dispersion and diffusion patterns in the area of concern, and an estimate of the productivity and diversity of the affected ecosystem.

This method of damage estimate is similar to a technique used in physiological and medicine whereby one establishes normalcy or baseline conditions, then measures the abnormal or affected condition after the fact, and thus determines the degree or percentage of dysfunction or impairment to the subject. This indirect technique is not necessarily site specific and basically is an order-of-magnitude estimate of damage.

The types of damages that are sustained when hazardous substances or pollutants are discharged in harmful concentrations and/or quantities can be identified as quantifiable and unquantifiable natural resources losses. Quantifiable losses include fish and wildlife resources and affected recreational uses thereof, which are, directly killed or impaired; indirectly killed or impaired, such as loss of a food item in the food web which consequently affects the rest of the ecosystem; directly affected so as to make them more susceptible to predators or disease; and those displaced because of avoidance or loss of habitat.

Although these latter impacts are theoretically quantifiable, extremely elaborate investigations would be required to document these latter secondary impacts to fish and wildlife. Unquantifiable losses would include such things as lost recreational opportunity, esthetic losses, and economic loss due to unfavorable publicity. In short, society at large suffers from the degradation of esthetic quality after a pollutant spill.

Senator CHAFEE. I must say that it seems to me you have gone pretty far to say it is quantifiable to tell what has indirectly killed or impaired a loss of a food item in the food chain. I am all for quantifying it if you can, but it seems to me you have put a pretty tough standard here, it is difficult to quantify that.

Mr. MARTIN. Let us say a particular organism in its life cycle feeds on a single species. Once you have eliminated that species, you detect some years down the road that the other species disappears as well. I think that has been at least theoretically one can do that. It is very difficult. I concur with your evaluation.

The concept used in the department's evaluation procedures is that fish and wildlife resources are considered property of the people of California. As custodians of California's fish and wildlife resources, the Department of Fish and Game is responsible for the protection and conservation of those resources.

Senator CHAFEE. Does that include saltwater fish?

Mr. MARTIN. Yes, sir.

If fish and wildlife are removed from or taken, the State shall be "compensated for all detriment proximately caused by the destruction." That is quoted from our State Fish and Game Code.

Once we have established that quantifiable, and unquantifiable, resource losses have occurred, we convert the losses into economic or monetary values. Several methods have been used to assign monetary values to aquatic fish and wildlife resources.

We have used six methods in California for establishing the value or compensatory costs of fish and wildlife resources destroyed by pollutants: (a) Replacement cost; (b) commercial value; (c) resource loss value; (d) ecological or environmental damage; (e) costs to fishermen; (f) liquidated damages. Our staff economist, Fritz Walgenbach, will present our current approach to establishing monetary values of natural resources.

In summary, our department is vitally interested in the prevention of, regulation of, and appropriate compensation for damages from hazardous substances discharge in California waters. We believe that a rational basis exists for the assessment of and compensation for such spills, accidents, and events.

We present, for your consideration and your committee's consideration, the following recommendations:

One, the utmost priority should be placed upon the prevention of hazardous spills into aquatic ecosystems.

Two, long-term monitoring studies of existing populations should be conducted at strategic potential spill sites.

Senator CHAFEE. What would that be, in the area of refineries?

Mr. MARTIN. In the area of offloading facilities, refining facilities, in those areas regional water quality boards and State fish and game have identified areas where spills occur—San Francisco Bay, Humboldt Bay and areas of extremely high natural resources.

Three, continued concentrated studies on the effects of hazardous materials to marine organisms should be continued.

Four, spill response teams with local knowledge and expertise should be organized and exercised on a routine basis.

Five, it is my feeling that further research in the economics of fish and wildlife resources and compensation for their losses should be conducted.

Thank you.

Senator CHAFEE. Thank you very much, Mr. Martin. That is a very thoughtful presentation.

Would you be suggesting that these be under the Federal or the State? In other words, your suggestions are towards what we are considering here, the possibilities of Federal law. But you say continued concentrated studies on the effects of hazardous materials to marine organisms should be continued.

Mr. MARTIN. The Environmental Protection Agency at the present time is conducting studies on pollutant effects, biological effects of pollutants. I believe those should be supplemented and possibly the mechanism would be provided in the hazardous spill regulations.

Senator CHAFEE. How about the monitoring of existing populations at strategic potential spill sites?

Mr. MARTIN. To my knowledge, those are not being conducted at the present time.

Senator CHAFFEE. You would have the Federal Government do that?

Mr. MARTIN. I would not object to that.

Senator CHAFFEE. It just seems to me the State would probably know those areas better than the Federal Government.

Mr. MARTIN. We work very closely both with other State agencies and with the Federal agencies. We would be willing to cooperate in cooperative studies.

Senator CHAFFEE. Why don't we hear from Mr. Walgenbach.

STATEMENT OF FRED E. WALGENBACH

Mr. WALGENBACH. Thank you, Senator Chafee.

My name is Fred E. Walgenbach. I am Senior Resource Economist for the Department of Fish and Game. I would like to summarize a brief statement that I have given to the court reporter to include in the written testimony.

I would like to address myself specifically to the development of monetary damage values assignable to fish and wildlife resources for the purpose of recovering for society those losses sustained from the impact of unlawful environmental alteration.

Since fish and wildlife resources are legally considered the property of the State and are administered as a public resource, the economic value of these wildlife resources cannot always be determined through the normal market forces of supply and demand.

Many of these resources, referred to as extra-market goods, are not subject to the auction effects of the market and, consequently, cannot be priced at the point of equality between supply and demand.

Due to their widespread appeal and importance, wildlife resources, like our highways, schools, national defense and national parks, have been relegated to control by State and Federal agencies to insure their availability to all segments of our society and not just to those who would be financially able to compete if these resources were subject to the market mechanism. Yet damage assessments are generally based upon some estimate of a market value for each natural resource element plus the associated effects connected therewith.

The principal beneficial effect of trout fishing is not the trout but, rather, the recreational experience of fishing. One must catch trout in order to maximize the fishing benefit, but need not take home any to fulfill the fishing experience.

But in the case of damage evaluation, the fish, as well as the fishing, become the pertinent entities to be evaluated. Damage assessment involves, in addition to the value of recreation, the well-being of the resource, the habitat and the well-being of the general public.

To account for the resource, its uses, and the value to society, resource damages have been subdivided into three basic component parts. These basic components are: (1) replacement value, (2) use value, and (3) existence value.

The replacement value is an estimate of an actual calculation of the cost of replacing the resource in question. In most instances, there is a time lag to reproducing and replacing the resource. In

those cases a present worthing calculation should be employed to bring all values to a comparable time frame.

The use value has two component parts. One is the nonconsumptive use, such as bird watching; the other is the consumptive use, such as waterfowl hunting. Each contributes to the total use value.

There are two possible methods of assessing the existence value. It seems that they are mutually exclusive and subject to the conditions which exist at the time of evaluation. The one is an aesthetic value; that is, the value derived out of the simple enjoyment of the resource. The knowledge that something exists and is there for everyone to enjoy now and in the future. The second is the feeling of loss. The psychological letdown prompted by the knowledge that something which did exist is gone and lost forever.

Determination of the evaluation procedure for deriving values for those various component parts is the fundamental objective of an economic evaluation.

Preparation of a species list of the plants and animals affected by an environmental change is the first step in deriving the damage. Determining the recreational use associated with the damaged flora and fauna becomes step two.

The third step is to determine the enjoyment potential which exists from the availability of these flora and fauna. Finally, a determination of the monetary value for each must be made.

Once the various factors have been identified, they must be related to their impact on the well-being of society. To do this, a method to calculate the extent of the damages, the time frame under which those damages will continue, the unit value for each damage segment, and the appropriate discount rate to apply in assessing the damage values must be derived.

The damage value will, in most cases, be a greater figure than the benefit value. A true benefit value implies that all relevant beneficial effects are accounted for and evaluated. This would include all the direct effects and all the indirect effects as well.

But benefits are constrained by one's income and one's willingness to expend capital or trade pleasurable experiences. Damage perceptions, while influenced by one's income, are less constrained. Generally, the loss has occurred and the subject of competing use does not exist. Hence, the damage value follows closely along the lines of welfare economics.

Welfare economics is used as a proxy for establishing a use value and an existence value for the fish and wildlife resources of California. Resource economists generally agree that in the social welfare context of natural resource management gainers should be able to compensate losers whether actual payments are made or not.

Review of the economic literature reveals ample support for this position. Economists conclude that a recreationalist will be constrained by his income in his attempt to secure the property rights from the competing use of the resource when the competing use seems to have prior control of the resource. But where the recreationalist has the initial rights, value is determined by the unconstrained minimum amount the recreationalist will accept in exchange for his right. If these measures of value are not the same, assignment of property rights can determine the outcome of the decision to allocate a resource to its optimum or highest value.

The application of this concept and the difference between willingness to pay and willingness to sell determine the welfare value or damage value. The entire premise is that under the damage criteria, any reallocation of societies, gainers must be able to compensate losers. To this extent, polluters, developers and users of the fish and wildlife resources must clearly compensate society for the loss of those resources.

Hence, for purposes of assessing values for various forms of wildlife destroyed as a result of negligence or uncontrollable mishaps, for which a given party is responsible, a minimum damage value will be assigned and assessed against the responsible party.

By definition, then, the damage is assumed to be equivalent to the average cost of providing the species involved, plus the potential recreational and aesthetic contribution made to society. The damage value to land and for habitat will be assessed as being equal to the cost of restoration or negotiated mitigation.

Senator CHAFEE. See if I follow this now. This is the way you in California arrive at assessing your damages?

Mr. WALGENBACH. We have several court cases over the past 10 years which I have worked on. We have used this methodology at arriving at a damage value, which in most cases reached an out of court settlement.

Mr. DUBIEL. Senator, if I can explain, we have to go into the form of a court to recover these damages. The court understands only two methods of relief. One of them is an injunctive relief. The other one is a monetary relief.

We have to put it into the language that the court can give us relief. So we translate the actual resource into a monetary amount and present that as evidence.

In actuality, that is what we have been doing is determining values for habitat, determining values for animals, and then presenting that as a claim as to the loss. So this has been done and is being done.

Sometimes, we use various methods, depending upon the animal that is involved; in other words, where we can get a commercial value, that may be the value that is placed upon it. If we cannot get a commercial value, we have other values.

But to understand the commercial values is a very small part of the total loss of resources. In other words, those commercial fish are not the only fish. There is an awful lot of other fish. There is a tremendous amount of loss that is not covered commercially.

Senator CHAFEE. Yes. That, of course, is the problem with the administration's legislation. They restrict it to commercial losses.

Mr. DUBIEL. Yes. In addition to that, another problem with the losses that the State has is the State has a tremendous amount of cost of additional regulation, additional work that has to be done on a major spill of any type. I believe the administration's regulation doesn't cover the recovery of taxes or administrative costs.

There are a lot of other costs that are associated with handling this type of a matter.

Senator CHAFEE. I don't think so. I think they just cover the costs of actual cleanup, not of the people. You would assess the charges for the people standing around where there was nothing to clean up?

Mr. DUBIEL. No. There is a lot of additional work that has to go on when you have a spill that isn't normal work that is done by the agency. In other words, there are many factors that the agency has, like bringing people in, a lot of fish and game people, a lot of other people, which normally doesn't occur.

That is just in the Federal Government. Normal functions of the Federal Government are budgeted. Whenever we have this type of excess matter or a spill, we have to take from the agency's people, and that is a cost.

Senator CHAFEE. You would have a certain overhead figure, a percentage?

Mr. DUBIEL. Yes, we would. There are cases that allow a certain overhead figure. The Santa Barbara spill, I think we used 13 percent as the overhead figure on whatever we were recovering.

Mr. WALGENBACH. Senator, may I suggest that the written presentation that I did not read because of the length of it and the time-consuming effect that it would have goes into much more detail on this procedural evaluation. It may answer some of your questions regarding the methodology, when you have a chance to look at that in more detail.

I would like to say also that while commercial fishing is a high priority in California, the number of species that are utilized commercially are few in regards to the total fish and wildlife resource of the State. If we were to exclude any recreational aspect in any Federal legislation or State legislation, it would grossly underestimate the damage effects that would be relegated to our fish and wildlife within the State.

So if I could encourage you that any legislation that would be enacted cover both the commercial as well as the sport.

Senator CHAFEE. Are these worked out in advance? For example, you say the third step is to determine the enjoyment potential which exists from the availability of these flora and fauna. Do you have certain of these standards, these values, if you wish, set up in advance, or do you wait until the spill occurs and then you go to the Santa Barbara Channel and say, "OK, now here is the beach and here is the fish, commercial fish and so forth?"

Mr. DUBIEL. We actually have both. In other words, when we get into the actual litigation, we have to have the specifics. That is a very costly item.

When we start out on any type of a spill, we usually try to extrapolate from other areas and get a cost item or what we call a preliminary report. In other words, in the usual manner when we work with these gentlemen, if there is a spill of any nature, I ask them for a preliminary report. They provide me with a preliminary report and I provide that preliminary report immediately to the polluter.

But when we actually get into litigation, we have to do it specifically. Therefore, it is very costly, as was indicated. This is one of the things that we would appreciate, if it could be done, is to take the cost of litigation, the court's time and the experts' time, and do it once, set up values that can be used, and that actually pay for the resource, so that we aren't reinventing the wheel every time, if I can use that statement. Because if we had a major spill as of today, we will say, off the Santa Barbara Channel, then we would

immediately have to get together and do the whole studies over again that we did before.

Senator CHAFEE. In your earlier testimony you suggested that the smaller spills just weren't worthwhile trying to collect from because of the proof problems.

Mr. DUBIEL. That is right.

Senator CHAFEE. But this might give you, if we had this done, it might help you with the smaller spills.

Mr. DUBIEL. Definitely so. No question in my mind that it would. A lot of times on small spills they are referred to me and sometimes I can handle them by a phone call because the oil companies involved know us and they know what we are going to present to them. But for many of them they are not handled because of the cost item.

Senator CHAFEE. Thank you very much, gentlemen. This is obviously a very important part of the damage assessment. I think it is extremely important. I think that the administration's bill doesn't go far enough in just dealing with the commercial value.

The thoughts that you have given us here, based on your vast experience, each of you, have been very, very helpful. So I appreciate your coming.

Mr. DUBIEL. Thank you.

[A letter to Senator Chafee from the director of the California Department of Fish and Game follows:]

STATE OF CALIFORNIA—RESOURCES AGENCY

EDMUND G. BROWN JR., Governor

DEPARTMENT OF FISH AND GAME

1416 NINTH STREET
SACRAMENTO, CALIFORNIA 95814
(916) 445-3531

July 3, 1979



Honorable John H. Chafee
U.S. Senate
Dirksen Senate Office Building
Washington, D.C. 20510

Dear Senator Chafee:

The California Department of Fish and Game would like to urge some language modification in your proposed amendment to S.2083 in the event that such legislation is passed.

California Department of Fish and Game requests that the words "in cooperation with appropriate state agencies" be added immediately after "Fish and Wildlife Service" as illustrated below by the underlined words in Section 5(e)(1)(A).

"The President, acting through the Administrator of the National Oceanic and Atmospheric Administration, the Administrator of the Environmental Protection Agency, and the Director of the Fish and Wildlife Service, in cooperation with appropriate state agencies, not later than two years after the enactment of this Act, shall promulgate regulations for the assessment of damages for injury to, destruction of, or loss of natural resources resulting from a discharge of oil or a hazardous substance, for the purpose of section 3(a)(2)(C) and (D) of this Act, section 5(a)(7) of this Act, and section 311(f)(4) and (5) of the Federal Water Pollution Control Act."

The Department of Fish and Game deems state input in determining the protocol for resource assessment as mandatory for proper consideration of regional needs and conditions.

In consideration of the above point, would you kindly enter this correspondence into the testimony presented by Mr. Frederick Walgenbach before your subcommittee hearing in San Franciaco, June 29, 1979.

Sincerely,

E C Beeman
Director

cc: Mr. Josiah H. Beeman

Senator CHAFEE. What we will do now is hear from Mr. Gilman. Then we will take a short break. Then we will proceed with Miss Siri and that panel and the final panel involving health. So we are moving along in good shape here.

Mr. Gilman, we welcome you. We would be delighted to hear what you have to say.

STATEMENT OF IVAN GILMAN, DIRECTOR, ENVIRONMENTAL AFFAIRS, CHEVRON U.S.A.

Mr. GILMAN. Thank you, Senator Chafee. For the record, my name is Ivan Gilman. I am the general manager for environmental affairs for Chevron U.S.A., which is the domestic oil and gas company for Standard Oil Co. of California.

My submitted statement reviewed the types of waste generated in the petroleum business and how they are handled in general. I will not review them in detail here. Suffice it to say there are many very different wastes and very different methods of handling them.

We also work closely with the department of health, Dr. Collins, the air resources board, Dr. Gordon's association, the California Water Resources Board, in developing our methods of handling these. We also use many regeneration and recycling techniques in doing so in order to minimize the amount of waste that we have to deal with.

I would like to touch just a moment, though, on the steel drum issue which you raised because that is one that plagues us all of the time.

The drums that are returned to us for reuse have a wide variety of materials in them, I assure you. It is not unusual to find things that are not on the label. Vermin, mice, squirrels, snakes, all sorts of things get in there.

Senator CHAFEE. That is not the worst things. At least something survived in them. [Laughter.]

Mr. GILMAN. And unfortunately, the person who bought the material in the drum from us considers that to be his private storage container until he returns it to us. So we are never sure, in spite of the labeling on the drum, what is in it. You certainly can't depend on it.

So we have a real problem in cleaning out these materials and then trying to get rid of the material that is cleaned from them.

Basically we try to clean them with a solution, take the paint off them, take all the dents out, and repaint them before we can reuse them. There are some which we can never reclaim. Some just have to be abandoned.

But all of the materials that you remove, no matter if they were of your origin or whether you are responsible for them or not, end up in our waste disposal system. They do present quite a problem to us at times. We find some of the strangest things on occasion that we don't know where they come from. We suspect a lot of it comes from these drums.

It is a big problem. Cleaning them and reusing them is a big problem, as I say. Some of them just have to be abandoned.

Senator CHAFEE. That in itself presents a problem.

Mr. GILMAN. It does.

Senator CHAFEE. You abandon them because I presume the drum is battered beyond repair or what, the substance in it is so toxic?

Mr. GILMAN. More often, rather than being so toxic, it is so difficult to remove. For instance, every once in a while you get a material that looks like molasses in there. For some reason, no matter what you do, you can't get the material out. That represents a potential contaminant to the reuse so you have to abandon the drum. What we normally do is cut the two ends out so it can't be used for anything else, and then they are either flattened and sold off as scrap or something else. But as a fabricated drum for reuse they are no longer viable.

We do get back some cans and plastic bottles, too. But very few of them are in shape to be reused. The material is so thin in them, by the time they survive and come back to us, they are just about nonreusable. You have to dispose of them as garbage.

I would like to present our views on the superfund or ultrafund issue. This proposal is described in S. 1341 which EPA generated and we think combines several very disparate issues under what we think is a cumbersome umbrella.

It is difficult for us to find the common thread of purpose or technology or exposure between the handling of oil spills, the handling of spills of hazardous substances, the creation, operation and inspection of dump sites, and the cleanup of previously abandoned dump sites of all sorts.

Chevron believes that oil spills and hazardous substances spills should each have a separate cleanup fund which is provided by those businesses and industries which generate the problem, including the Government agencies, because they are a part of this whole problem.

The funding of the creation, licensing and inspection of new class I dump sites could also be funded by those who use the facilities as long as all of the users were included in the contribution. But to try to go back and handle the cleanup of abandoned sites in this manner seems to us to be improper. Charging these costs to any industry or set of industries will represent in fact a tax upon these businesses.

The public presumably benefited from the lower cost of products which resulted from the use of these abandoned sites by the dumpers in the past. If it is determined that cleanup is in the public interest, it is much more logical to fund such cleanup from general tax revenues rather than a tax imposed upon industries which may have had no more association with the creation of the problem than the most remote sector of the general public.

We believe that the combined handling of these activities under a single fund is neither proper nor efficient.

The other thing I would like to just address briefly is one you have touched on, and that is the availability of class I dump sites.

Senator CHAFEE. I would just like to touch on what you have discussed there. Of course, your products go into the feedstocks which make the plastics and contribute a portion of hazardous substances.

Mr. GILMAN. Certainly. We therefore would be paying a part of the cost of that fund. The fund would be used to take care of those spills. But I don't think it is clearly established when you are

talking about cleanup of old dumps that are around how the material got there.

The other thing that bothers me, when you combine a spill fund with any kind of a cleanup fund, you raise the problem always that one of the previous speakers did. Suppose you have a couple of bad oil spills or an oil spill and a hazardous substance spill back to back. Now the total fund is available to do all of these things. But the amount of cleanup that you are able to do on existing sites may have to vary with the experience of the spills that are taking up parts of other funds.

As I understand it from Mr. Jorling in Washington last week, these funds would be commingled. If they are, then you have this problem of an unpredictable occurrence which all spills will be. You can say on a statistical basis there may be five a year or something like that. But you can't say that if we take on the cleanup job of 20 dump sites, say, in the year 1981, that the funds that you use for that will be available if we were unfortunate enough to have a couple of bad spills that had to be contained.

Now bear in mind most companies like our own would not benefit from those funds. We would be paying into them, but we would be paying our own costs of cleanup because we are deemed to be a responsible company. We have always done so. We have had our spills, some fairly sizable. But we have always paid the entire cost. It has never come out of any fund anywhere. Nor would it under this proposal.

Senator CHAFEE. Why not?

Mr. GILMAN. Only if we exceeded the normal limit of liability would we be doing it. We would normally be expected, as the legislation as written expects any responsible spiller, to still bear the cost of cleanup. I believe that is still fundamental. We don't object to that. We think that is probably proper.

Senator CHAFEE. So you would like the fund just restricted to oil spills.

Mr. GILMAN. Oil, hazardous materials and then have a different fund take care of the cleanup of old sins.

Senator CHAFEE. All right. By all right I mean I heard you.

Mr. GILMAN. I didn't really anticipate complete agreement.

The other thing I would like to touch on just briefly is the problem of the class I dump site, a different connotation perhaps than has come out before.

We are concerned that there are many things which are large volume, relatively low toxicity, that will be relegated to class I dump sites. That is true here in this State. For instance, drilling muds. You have to dispose of them here in the State of California to a class I site. Those are large volumes. Toxicity is relatively low.

Senator CHAFEE. In California you have a class I and you have a class II site.

Mr. GILMAN. That is right.

Senator CHAFEE. But in this legislation, it is just class I sites, isn't it?

Mr. GILMAN. There certainly will be sites for very hazardous materials and for less hazardous materials. My problem really, Senator, is the problem of handling the very large volume, very low toxicity materials into these special sites.

You have heard there are only 11 in the State of California. If you fill them up with all the materials that have just marginal toxicity and marginal hazard, then they are not going to be available when you really have a bad actor to take care of.

So it is that filling up of what is in our mind something of marginal toxicity that presents one of the greatest problems to the so-called hazardous dump site or class I as it is called in California.

We think that EPA and the States should very carefully examine what has to be disposed of in these most exotic dump sites so that we don't fill them up prematurely with material that probably doesn't need to be there. There are other types of sites that could accept this without any danger to the aquifer, without danger to the surrounding populous.

Senator CHAFFEE. But you don't put oil muds in your class I sites here in California, do you?

Mr. GILMAN. Yes, we do. If we dispose of them, the State lists them as hazardous. As hazardous materials, if they are disposed of here, they would have to go to a class I site.

Senator CHAFFEE. Yes. But are they classified as class I?

Mr. GILMAN. At the present time, just recently. We are still debating that issue with the State. It is one of our problems. Spent cracking catalysts, which looks like sand, is the same thing. It has metals which our researchers say don't leach into the aquifer, and yet there is a large volume to dispose of. It has not been classed hazardous yet, but if it were, it is the type of thing that fills the site rapidly and doesn't really belong there as far as the very sophisticated treatment that the material that is in there receives.

So those are basically the items which I wished to address. I did eliminate all of the description of how we generate our waste, thinking that is in the written testimony and you can cover that. If you have any questions, I will be glad to try to answer them.

Senator CHAFFEE. Thank you very much, Mr. Gilman, for your thoughtful presentation.

Senator CHAFFEE. I don't think I have any questions.

You heard the State of California people just previous to you.

Mr. GILMAN. Yes, I did, sir.

Senator CHAFFEE. They have gone pretty far in the areas that we compensate, way beyond commercial fish and so forth. What are your thoughts on that?

Mr. GILMAN. Of course, we have dealt with the State people on many occasions. Obviously, we don't agree. We have stayed pretty well to commercial species or food chains immediately identified with the commercial species because they can be quantified.

Our concern, for instance, in the reduction of zooplankton, another general food material in the overall sea, the only way you can even come close to quantifying it is to make an assay of what is in a typical square mile or something—

Senator CHAFFEE. I appreciate that. I am not cutting you off, but I understand that. But OK, you can't quantify exactly.

Mr. GILMAN. Right.

Senator CHAFFEE. But we know it is a valuable asset in the food chain. So what do we do? Do we just say you can't quantify it so, therefore, the person who is at fault—we have to assume that in this instance the oil company is at fault for making the spillage.

Why shouldn't the people who own the resource, namely the people of California, why shouldn't they be compensated?

Mr. GILMAN. I guess I have a more selfish view perhaps, but the resource will not be replenished. In general, things like zooplankton and things in the food chain, we will not go out and buy biological specimens and replenish. The rate of replenishment is so quick in most parts of the ocean that we are only talking about a very short period of time—sometimes weeks, sometimes months—but a very short period of time before these populations are built back up.

Senator CHAFEE. I suspect you would find a good deal of argument on the other side on that point.

Mr. GILMAN. Well, you will on one issue especially. What is the replenishment of the population? Is it a complete diversity of the age group or is it just total numbers of a species?

This is a hard thing to address. But we in general have stayed with the advocacy that things that can be quantified or are in the commercial food chain can obviously be billed and those are things that are valid. The other items we believe are so, I won't call them remote, but they are so undefinable as to what do we do about them? You fine us for them, but the species replenishment doesn't take place.

Senator CHAFEE. Presumably they are making an effort to replace it or to protect it to a greater extent from being exterminated in another area. You weren't impressed by the testimony this morning that there is more to catching the trout than the catch.

Mr. GILMAN. I am a trout fisherman and come back with an empty creel lots of times.

Senator CHAFEE. Has that been a useless day?

Mr. GILMAN. Probably not, no. I don't think that that is my connotation. I am probably not being as lucid here as I could be. But it seems to us that there the species are replenished rapidly and no amount of fine to the spiller, whoever he be, our company or any company, will replenish the species any faster.

What is the purpose of the fund? There are already very formidable financial penalties to anyone who spills, regardless of this natural resource damage.

Senator CHAFEE. I think the purpose is a deterrence. I think there is always the purpose of replacement, some effort to replace. It may be that the fine can help keep a trout hatchery going someplace.

Mr. GILMAN. If that were true, if we are really talking about replacement, we wouldn't take as much exception to the issue, when you are talking about replacement. But when you get out into the ocean and start hitting us for zooplankton, for example, which are very minute things, there will be no replenishment of them. They will grow on their own. There will be nothing done. You are right, it is a financial deterrent, but that is all it is.

Senator CHAFEE. You haven't persuaded me completely. I wouldn't say you have persuaded me at all.

Mr. GILMAN. We have a lot of data on this, and we have a lot of arguments on it, with a lot of people who are a lot more versed in this than I am. This is marine biology, which is not my field, by a long shot.

Senator CHAFEE. We have received your thoughts and appreciate your coming to testify.

Why don't we take a 5-minute break.

[Brief recess.]

Senator CHAFEE. We will start again now. We would ask our next panel to come forward, which is Miss Siri and Mr. Krefting.

Speak right into the mikes, if you would, please, and identify yourselves. Do you each have a statement here?

Ms. SIRI. I have one.

Senator CHAFEE. All right, Miss Siri. Why don't you go ahead.

STATEMENTS OF JEAN SIRI, PRESIDENT, WEST CONTRA COSTA CONSERVATION LEAGUE, AND STEVE KREFTING, SIERRA CLUB, SAN FRANCISCO, CALIF.

Ms. SIRI. My name is Jean Siri. I am here in sort of a citizen role because I have been Chicken Little screaming the sky is falling for so long. As I said in my report, until the Love Canal and the Valley of Drums, it has been very difficult to be heard.

One of the things I wanted to tell you, Senator, is that I have testified at all the EPA hearings on the crying need to stop hazardous waste dumping and get on with resource recovery or reuse or recycling. The EPA response has always been that Congress didn't mandate or even mention this in RCRA, as it applies to hazardous waste. So this is the main thrust of our request to you, that there be some resource conservation and recovery of hazardous waste, which can be done.

Senator CHAFEE. It seems to me today when we were out at IT they were doing what they could to recover.

Ms. SIRI. They are doing some things. They are doing what is financially feasible since they are a private company.

Let me go on with this and then I will come to it.

The Canadians have been eliminating chlorinated hydrocarbons in cement kilns.

Senator CHAFEE. What do you mean by that?

Ms. SIRI. They burn it as fuel. It is tremendously successful. There is a complete destruction of the hazardous wastes. There is no pollution. There is less pollution coming out of the stacks than goes in, certainly, and they have a fuel supply.

We had this all set up with a cement company and with State public health in California and with the EPA, but the company got scared of indemnity. It didn't have any indemnity in case of difficulty, and for want of support the project is just sitting in limbo now. All the PCBs in California could have been handled this way.

There was a company in the South and a company in the North that were interested, and with the need for fuel at this time and the ability to get this fuel free it could have been fantastic. So the PCBs are still going underground.

We feel that as long as hazardous waste sites are privately owned and operated for great profit, as long as it is made easier and perhaps cheaper, certainly easier, to put it in steel drums and bury it under a mandated amount of dirt, that long will we continue to build in a real threat to our children and grandchildren.

Hazardous chemicals do not disappear. There is some sort of wonderful belief that you put them in the ground and cover them

with dirt and they just disappear into the dirt and get all cleaned up. But they don't. The barrels rust through in about 5 years, depending on the amount of rainfall and the corrosivity of the material in the next barrel, and the hazard remains.

I live in the city of Richmond. We have what is really a rather small class I site. In 1977, 29,000 tons of hazardous waste were dumped there; in 1978, an average of 2,700 tons per month, and growing, on the edge of San Francisco Bay.

The State of California's hazardous waste management program, from the public viewpoint, has been slow starting and not very satisfactory. We have probably the best regulations in the United States and the poorest enforcement because of lack of financial support and lack of enthusiasm at the top.

Two years ago, in alarm, I personally went to a legislative oversight committee and showed slides of the lack of enforcement by State water quality and by State public health at the Richmond dump. I have brought you a set of prints of the slides I showed the legislature.

Senator CHAFFEE. That is a pretty—

Ms. SIRI [interrupting]. Bad statement.

Senator CHAFFEE [continuing]. Rough charge you are making here.

Ms. SIRI. Yes, it is.

Senator CHAFFEE. Lack of enthusiasm at the top. We have had the top officials here today.

Ms. SIRI. Yes, you have.

Senator CHAFFEE. I suspect they might dispute your statement.

Ms. SIRI. I am sure that is probably true. There has been much improvement.

You know, every picture you have there is a violation of water quality or of State public health regulations. There has been very much improvement at the site since that hearing. However, this year a series of articles appeared in the Oakland Tribune and the Sacramento Bee papers and you can see that the problems are nowhere near being remedied in the State.

I believe the State gets about \$1 per ton dumped. That figure may not be right now. But this does not go to more enforcement or laboratory facilities but has gone into the State health's general fund and seems never to have come out. So enforcement goes where the heat is but with not one-fiftieth of the manpower needed.

There is one most successful part of the State program, and I don't think Dr. Collins emphasized this enough. That is the hazardous materials management section. One man is the program for the whole State. He has clearly demonstrated the way to recycle hazardous wastes. As yet the State administration has demonstrated no real support for the program. But we highly recommend this program to you for the whole country.

I have brought a copy of a reprint on the work that has been done in California that was in the American Chemical Society Journal on environmental science and technology. One of the things that I stress that is this is a one-man effort, but the State of California at least was forward looking enough to get on with resource recovery.

We were able to get legislation which requires that a disposer must justify not having recycled recoverable, reusable waste products. It also mandates the recovery or recycling of reusable materials whenever it is economically possible.

As you can plainly see, that is pretty vague language. However, this program in the State has been the lever to encourage people to recycle. We are very excited about this program. We think it might eliminate the need for a great many hazardous sites. I am happy to give you this reprint.

Senator CHAFEE. Fine. Thank you very much.

Let me see if I understand this. The program you are most interested in is discussed in this article.

Ms. SIRI. Yes.

Senator CHAFEE. Which is the whole subject of recycling.

Ms. SIRI. That is right; recycling, reuse, whatever.

Senator CHAFEE. Is it your feeling that all hazardous wastes can be recycled in some way?

Ms. SIRI. The majority. I do think just about the majority. Certainly over half could be recycled this way, economically.

Senator CHAFEE. Do you think it is not done more because of lack of profitability in it?

Ms. SIRI. That is part of it. It is a private industry. A certain amount of chemical sophistication is required for these programs. It requires a one-to-one conference. You can't really do it with just an inventory of what is available. You have to talk with people and explain. You see Dr. Schwarzer has been called by a great many States to give them suggestions on this. He is the one who came up with the cement kiln proposal for PCBs.

Senator CHAFEE. Which is used in Canada.

Ms. SIRI. Which is used in Canada. So we are very excited about that.

One of the most helpful and active agents for the public has been regional air pollution inspectors. They desperately are in need of more controls for these industrial sites if there are going to be this many class I sites, and especially for the ponds. The ponds have been notorious for the amount of hydrocarbons coming off.

The inspectors feel that the burden of having vapors analyzed has to fall on the company causing the synergistic effects. The synergistic effects for air pollution are quite extreme. It may be that it is the chlorides in one pond reacting with ammonia in the next pond to create a tremendous vapor; the companies also superchlorinate to eliminate sulfide odors, which are a great problem downwind—17 toxic and 3 carcinogenic—downwind of many of our sites now. I think you went to Benicia. I don't know if you went to the Baker site in Martinez.

Senator CHAFEE. We went to Martinez and Benicia.

Ms. SIRI. You will have observed there are cattle grazing there, there are crops, there is agriculture use in the area, and so forth. There are children. They are downwind a lot of the chlorinated hydrocarbon emissions, which is a serious problem.

Something that hasn't been mentioned today that should be mentioned I think is the danger to employees at hazardous waste sites. The sites are often in combination with regular garbage sites, often

with mixing; that is, using garbage to sop up hazardous material instead of using ponds.

Senator CHAFFEE. That would be a clear violation of the rules, wouldn't it, of the regulations, the law, in California?

Ms. SIRI. It depends. Now on the old site at Antioch, which was what we called our Love Canal, they were cleaning up the hazardous waste ponds with garbage. The garbage is still being dumped there.

Senator CHAFFEE. I mean the other way around, mixing your hazardous waste with the garbage.

Ms. SIRI. There is always some mixing, you know, in the best of times. The regulations require showers, eye washes, et cetera. In practice, at the Richmond dump there is a barrel of rusty water and the lid won't come off. This is what the employees tell me.

In my community the other problem that troubles me is the hauling of hazardous wastes. It is trucked through El Cerrito, Richmond, San Pablo and North Richmond residential neighborhoods to get to the dump. In Martinez you may have observed there are two sharp curves past yards of playing children for trucks to get to the dump.

In California the highway department is in charge of hazardous waste hauling. They believe the highway patrol enforces, and they do not. As far as we can determine, no one really does. We seem to average about one accident a day on the highways of California. The drivers are at risk in that they do not know for sure what they are carrying. The manifest may or may not be what is being carried. They do not know if pressure is building in the tanks. They have no safety clothing when they open the vents and unload into the ponds. The manifests do not really show what they are carrying.

For example, Dow Chemical hauls extremely hazardous carcinogens to an Arizona mine shaft and to Utah, paying \$100 per drum. This is interstate trucking, hazardous all the way. I don't know nor do the teamsters, who controls the hauling.

We feel that a lot of the problems, the most serious problems, and the increasing quantity of hazardous waste is caused by the makers of plastics, pesticides, defoliants, new untested chemicals, and they must bear the burden of the cleanup of old dumps they were responsible for and the prevention of any ground, water and air contamination. It must be remembered that some—and I think this is important—hazardous products are not marketable in the United States but are sold overseas and the residue from them remains in this country in the ground at the present time.

Our Love Canal type place is in Antioch. This is how the EPA refers to it. It was a garbage dump, used for 20 years for hazardous waste without a permit of any kind. The city fathers permitted the hazardous ponds to be surrounded by an expensive new subdivision. You can imagine the results. The landscaping withered, the paint and metal corroded and the odors were appalling. The people damage will, no doubt, appear in a few more years. This was IT's site.

After a beryllium explosion a cloud floated over the community, the people became alarmed. They could get no enforcement in the State so they finally sued and the place has been closed down.

The favorite site for hazardous waste, at least in the San Francisco Bay area, is always on the edge of the bay or any other waterway. We have many large ponds on hilltops with spillways in case of earthquake, as required by law.

What happens in 100 years when the site has been long closed and the dikes decay and are not repaired, when all those rusted barrels and barrels of lethal waste flow into San Francisco Bay?

Just this week, yesterday in fact, we were contacted by a group of very distressed women in the Los Angeles area. It is proposing 720 acres of chemical waste ponds in southern California to process a third of the industrial waste of California. The site is across the street from an elementary school on top of the water table, from which wells supply drinking water. The citizens are extremely concerned by the location, as am I, but State public health, as always, finds the site geologically pleasing.

Senator CHAFFEE. A class I site under California law, it is my understanding that there cannot be any water table underneath the site. Not only does it have to be a very, very dense clay substance underneath, but there can't be any water table below it.

Ms. SIRI. I am telling you what the ladies have told me. That is the best I can do.

Senator CHAFFEE. We run into this whole problem of people want these—you have been here right along, I believe.

Ms. SIRI. That is right.

Senator CHAFFEE. Everyone wants these things safely disposed of—handled correctly.

Ms. SIRI. But they don't want them in residential areas; that is true. Nor should they ever be allowed these!

Senator CHAFFEE. As I understand the IT people, if this is the one they are discussing down near Los Angeles in southern California, the closest residence, didn't they say, is over a mile away?

Ms. SIRI. That is not what those people said. I don't know the site at all.

Senator CHAFFEE. There is a man from IT back there. Am I correct?

Mr. MEICHTRY. That is correct, Senator.

Ms. SIRI. They seem to feel it is a rapidly growing residential area.

Senator CHAFFEE. I don't feel there is any need for us to get into that particular one.

Ms. SIRI. But this is one of the problems to be addressed. If it is a rapidly growing residential area, rather than zone and build a subdivision around the class I ponds, which is the way it ends up, unless there is some sort of arrangement, my feeling is no one is addressing the real problem. It is just getting moved around a little.

What we wanted to recommend to you is that we need a more active and well financed program, both in California and at the Federal level. The regulation is only as good as the enforcement that you get.

We have had a feeling for a long time that the best way to handle hazardous waste is for it to be State or federally managed. I think maybe it might be a wonderful job for the Corps of Engi-

neers. They could get away from dam building and they could engineer hazardous waste sites.

Senator CHAFEE. It seems to me you have been pretty severe in your indictment of the governmental agencies here today.

Ms. SIRI. No, not at all.

Senator CHAFEE. Well, it has been a litany of failure to enforce.

Ms. SIRI. That is our problem, we feel. I am giving you—

Senator CHAFEE. Now you are suggesting that the solution is to have the Government run it all.

I am not trying to tease you or anything, but—

Ms. SIRI. No. We just feel we must get away from a profitmaking motive and there would be more interest in recycling. We are running out of space where that you can safely put this stuff. We feel we should have a maximum of two such sites in California, one north and one south, and then as much recovery, reuse and recycling as is possible.

Senator CHAFEE. The prime point I get from your testimony is the need for greater recycling.

Ms. SIRI. Yes. That is it.

Senator CHAFEE. Instead of trying to dispose of these dangerous materials, hazardous materials, that more effort should go into recycling and that we have to step up and realize we can't just depend upon the free market to do it, because in many instances it is going to be very, very expensive, far more expensive than the free enterprise system can support. Therefore, it is a logical place for the Federal Government to spend some money. Is that right?

Ms. SIRI. We feel that what we really need to do this is a tax incentive program. Nobody is going to do it if there isn't some financial encouragement with an escalating fine system for ground pollution and environmental damage, that sort of thing. But I think you have to have a tax incentive for industries to do this, too.

At the moment, no real attention is paid to the toxicity value. There is a lot of energy content being wasted. Whether it could be burned without air pollution I don't know. But that is the main thrust of our appeal to you.

Senator CHAFEE. I think that is very helpful. I think particularly your directing our attention to this recycling and the article you have here helps. We do spend all of our time, everybody testifying on a certain point, whereas the real solution might be someplace else, as you have indicated.

Ms. SIRI. I hope that is it.

Senator CHAFEE. So we are grateful for your testimony. We will take a look at this. We will put this in the record.

Thank you, Ms. Siri.

[An article, submitted by Ms. Siri, follows:]

RECYCLING HAZARDOUS WASTES

A successful California pilot experiment, soon to be expanded, offers incentives for conservation and environmental protection plus economic rewards for participating industries

Carl G. Schwarzer
Dept. of Health Services
Berkeley, Calif. 94704

Recently, the California Department of Health, Hazardous Materials Management Section (HMMS) undertook a program to locate and identify the waste streams of various companies in the San Francisco Bay Area whose components might be recycled. The purpose of the program was to conserve energy and chemical resources by reusing materials which normally would be disposed of, and to reduce the volume of materials going into disposal sites.

Philosophically, the Department believes that land burial of hazardous waste should be used only as a last resort. Burial of highly toxic wastes presents hazards that project into the future over an indefinite period; for example, there is little assurance that the Class I sites so carefully selected to confine hazardous waste materials today will function in this capacity forevermore.

This is not to say that land burial does not have its place as a disposal method. It should be used judiciously, but whenever possible, alternate methods should be considered. The

best procedure for solving waste problems is to reuse the waste material in other production processes to reduce its generation. This, of course, is not a novel idea, but what is new is the use of hazardous waste materials in new and different applications.

Economic feasibility

Almost all materials are recyclable, but to be viable the reuses must offer economic incentives. All materials are not economically recyclable; in some, more energy will be expended in recovery than the recovered value warrants. Hence, many factors need to be weighed. Recycling programs require careful scrutiny and evaluation to assure that a viable solution to the problem will be achieved. Mixture complexity, the processing equipment required, available technology, technical capability and geographic location are all factors that need to be addressed. And, of course, most important of all is the question of whether or not a net gain of value is obtained.

If suitable processing or reclamation equipment and technology are not available, the material may or may not be reusable. A case in point is a mixture of epichlorohydrin, methyl ethyl ketone, methyl isobutyl ketone, ethanol, propylene chlorohydrin and water. This mixture is the result of an epoxy

resin process and is rectified and recycled on a routine basis by a large epoxy resin manufacturer. A small operator would find this material to be an unseparable mixture, essentially nonrecyclable.

Simple mixtures, as a rule, are easier to process than multicomponent mixtures. For this reason, the HMMS encourages industry to keep waste streams separated and as simple as possible. However, this cannot always be done and, as a result, some non-reusable waste streams are generated under the best conditions. These waste-solvent mixtures may still be useful as fuels, however.

Geography, as well, plays a key role with regard to the reusability of a waste. Many times optimum utilization of a waste requires its combination with a waste that at a different location. The feasibility of reuse in this situation is completely dependent upon the proximity of the two wastes. Transportation costs can quickly negate such opportunities.

Department's efforts

The hazardous waste recycling program has involved the investigation of many waste streams from a variety of industries. Because of the unrestricted opportunities for exploring the waste streams of completely different

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types of industries, the Department has been able to "marry off" wastes of companies that normally would have little or no contact with one another. The Department has supported only a low key effort to date. One man in the San Francisco Bay Area has initiated a pilot program which has proven so successful in promoting waste recycling that it will probably be greatly expanded over the next year.

The most productive means of obtaining the needed information for waste reuse is by personal interview, which identifies a potentially useful product that is presently being wasted, and uncovers potential consumers. Furthermore, by personal interview a relationship is established that is helpful in not only locating useful waste streams, but also in convincing companies to investigate the use of a waste stream in their production line.

An alternate method is the clearing house concept. As the name implies, this involves the collection and wide dissemination of information regarding industrial waste resources. Information describing the type of waste material, concentration, impurities or contaminants, as well as the physical location of each waste is obtained. The use of a questionnaire is the usual way the data are accumulated, although personal interviews may be used. The information can be computerized and/or published and disseminated in the form of a list of materials available, and a list of materials being sought.

The clearinghouse idea, however, does not automatically solve the problem. It is merely a tool that can be used to expedite waste information exchanges. The system does not automatically assure that waste exchanges or uses will develop. Recycling and recovery need to be worked at; they require many hours of technical discussions, the services of technical personnel, consultation and hand holding to fit waste streams into present technology. While there is a need for the establishment of a data bank, the passive clearinghouse concept does not work well without active support.

The problems with a list

In regard to the computerized lists generated under the clearinghouse concept, several difficulties are associated with the periodic mailing of a waste list to potential users. The list may not get into the hands of the right person, especially in large companies; consequently its value is lost.

The time required to assemble and



Prior to treatment this heavy clay soil supports only light crops of salt grass



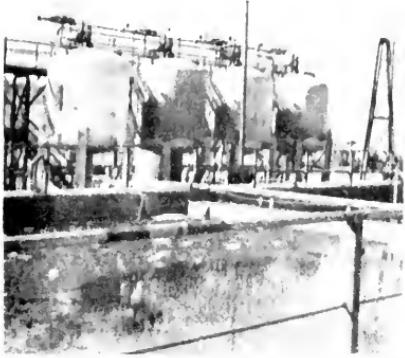
Lime-sulfur sludge from a nearby chemical plant is being applied to a field



Lime-sulfur sludge from a nearby chemical plant is being applied to a field

Right. This plant processes waste solvents

Below. Pickle acid from this steel plant is chlorinated to produce ferric chloride, which is used to treat sewage at a sanitary disposal facility



distribute a list is relatively long (usually one month), but an arrangement might be made for the information to be published in a newspaper on a daily basis. This is not inconceivable. However, most companies are not receptive to the idea of holding waste materials on-site for extended periods of time.

In reality, however, a waste producer may not have a steady production of waste; he may produce, for example, 30 drums of "spent" acid over a period of time. Usually, he is not receptive to the idea of keeping the material any longer than necessary. He wants a more positive response than to store the material on-site hoping that someday someone will take it away.

Most industries interviewed have indicated that a list sent by mail probably would not even be read unless they were actually looking for a specific material. Several reasons are cited.

Companies have a great fear of changing an established process that has been proven successful over a long period of time. To interchange a pure feedstock for somebody's waste stream takes a great deal of investigation and thought; a mistake could prove to be extremely costly. In addition, companies require assurance of a continued level of purity and quantity. Hence, in a great many cases, com-

panies will not seek out a source of materials that may jeopardize either their production rate or quality.

In the personal technical interview, some of these fears can be allayed. Problems of this kind can be discussed in detail and possible solutions addressed. A complete description of the waste can be given and arrangements for samples made.

Hindrances

Many industries are sensitive about protecting information regarding their production rate and manufacturing procedures. The types and amounts of waste components generated are sources of information that a competitor can use to his advantage to obtain valuable production data. Hence, in a recycling program it is necessary to address and solve this problem.

Another problem that occurs with mailed questionnaires involves reported accuracy of the composition of the waste streams. Incomplete or deficient information can lead to poor experiences. A case in point involved the transfer of 48 drums of 92% acetic acid which was shipped to the recipient and subsequently returned. The generator had failed to note that the acid also contained 2% chromic acid!

Another factor that frustrates the efficient use of the clearinghouse pro-

cedure involves interaction of governmental agencies. It is sometimes difficult to obtain clearance to recycle without the services of an intermediary agency.

For example, a galvanizing waste pond located in the San Francisco Bay Area contained sufficient zinc and iron content to be of use for soil application in the Brentwood area (40 miles away) where these elements are deficient. A farmer was located who needed the material and was willing to test it on his soil.

The Department of Health Services analyzed the material to assure that no heavy metals deleterious to the land were present in any significant concentrations. Agriculturists at the University of California at Davis agreed that the material might indeed have beneficial effects on the soil to which it would be applied. The problem now revolved around the location of the pond and the area in which the material was to be used.

The pond was located in an area under the jurisdiction of the San Francisco-Oakland Water Quality Control Board. This agency was concerned about removing this potentially hazardous material as soon as possible (probably to a Class 1 disposal site) since they wanted the assurance that the pond would be properly phased out. The exigency of time revolved around

the fact that the company had ceased operations in the area and was indeed preparing to abandon the area as a production site.

The agency, which had control over the area where the material was to be disposed, wanted to be assured, as did the farmer, that the pond contents would be beneficial before applying 3.5 million gallons of the material broadly and indiscriminately over the land. The agency also wanted to make a test plot which involved raising a crop and evaluating the results. This, of course, would postpone the removal of the pond contents for six months to a year.

The problem was solved by the Department's Hazardous Management Section in bringing Water Quality Control Board representatives, the farmer, the prospective hauler and the producer of the waste all together at a meeting where all questions could be addressed and answered to the satisfaction of all those involved. This problem could not have been rectified by just using the clearinghouse concept.

Perhaps one of the most difficult problems regarding the clearinghouse concept is the fact that there is a tendency to collect all the "dogs." The useful components we assume will eventually be used or put to work. If things work, the easily recyclable waste will be quickly removed from the list. But some materials may have a very low potential for recycling and these will tend to accumulate. The clearinghouse concept makes assessment difficult, but the dynamic technical interview concept allows for an appraisal to be made at the time of the interview before the material is entered into a recycling list.

Interview approach works

Making a list of materials available and distributing the list is a minor part of a recycling program, but it has its place. A more dynamic approach involves interviews in which technical discussions are held regarding the waste streams. Quantity, contaminants, and other discretionary information of importance can then be secured. Many such interviews are required before a recycling program really begins to "kick" and gain momentum. Then the industry will respond to this "fee-free brokerage" service.

When this occurs, another facet of the program can be invoked. Assistance can be rendered by suggesting alternative procedures for waste usage that can be of great economic value to

a company. These alternate procedures, which may not be apparent to the waste producer, are the direct results of the interviewer's vast knowledge of industrial information accumulated by his contacts in the industry.

Although the task of interviewing a myriad of companies to define their waste streams might seem formidable if not impossible, the process can be greatly shortened. A practical means of achieving this goal, and accumulating a large amount of information, is to become familiar with the effluents from the various types of industry. For example, most steel processing plants have a waste stream known as "pickle" and it usually contains about 10-15% ferrous chloride or sulfate and a few percent of acid. If a need for this type of material arises, a large portion of the steel industry is available as a source.

Industrial participation in the program has been gratifying. In most cases, complete cooperation has been received. Industry has not only sanctioned the program, but is gratified to learn that the state has instituted a program to help it solve its disposal problems. To some, the service offers income from an unexpected source; to others, it reduces the amount of money spent on disposal fees; and to still others, both incentives are provided.

At the present time, most plant managers are willing to discuss their processes and waste streams with state interviewers. Recycling advice is given whenever appropriate. At other times, technical advice, which allows the generator of a waste stream to convert it into a useful and valuable by-product, is supplied. These services are given without cost.

The Department learns of potentially useful waste products in other ways, notably through our disposal-site-surveillance activities. Inspections of waste disposal sites, both Class I and II, by field personnel frequently reveal that large quantities of high-quality commercial materials are being disposed of. Large loads of chemicals in unopened bags and drums are frequently discarded. The operators of the disposal sites are asked to contact our office if materials suspected of having recoverable value are brought to the site. Cooperation between the site operators and our inspectors results in the retrieval of much valuable material that has been delivered for disposal.

Managers usually welcome recycling advice and, in most cases, quickly follow up the contacts that are suggested. After all, the alternative to recycle is disposal, usually at consid-

erable expense. When two parties are brought together, the work of the Department has ended. Our sole function is to bring the right parties together to avoid disposal. The details of the transactions such as whether the material is sold, given away outright, or who pays for transportation are left to the two principals involved. There have been times when the transactions have been unsuccessful, but this is the exception rather than the rule.

Reclaiming nonhazardous wastes

Much useful nonhazardous material is being thrown away also. This usually occurs because disposal is easy and convenient and relatively inexpensive. A case in point involved a breakfast-food manufacturer who discarded 18 semitrailer loads of breakfast food into a Class II (domestic refuse) site. This material was boxed and "cartoned" and ready for distribution at the time of disposal. Why was it discarded? Too much vegetable oil had inadvertently been used during manufacturing, thus possibly affecting the shelf life of the product. It was cheaper for the manufacturer to dispose of the material than to reopen the boxes and recover the breakfast food for animal consumption.

Our program was explained to the breakfast-food manufacturer, whereupon he offered to cooperate with us for alternate disposal in the event of future problems. Six weeks later, the manufacturer contacted us about another batch of breakfast food damaged by an overhead sprinkler failure. We contacted a pheasant farmer who was delighted to receive the material; he was saved \$4000 on his feed bill for that year!

Many other examples of nonhazardous waste disposal of usable materials have been observed. Whenever possible, we assist in recovering nonhazardous industrial waste materials for reuse as well as the hazardous materials.

Categories of hazardous wastes

Our interviews with company personnel indicate that about five broad categories of hazardous waste are being generated. These include:

- materials or "articles" of commerce
- process wastes that are reusable without treatment
- materials that are reusable with treatment
- waste materials that have little or no value
- materials that no one wants to recover.

In the first category, materials of



Ferrous sulfate is used at this geothermal well to remove hydrogen sulfide from steam prior to reinjecting the steam into a return well

commerce, we have found many kinds of materials being discarded. For example, many gallons of concentrated caustics and sulfuric, nitric, and hydrochloric acids are being disposed of daily. These are in addition to the nonusable dilute solutions that are being thrown away. Needless to say, unused materials of commerce are the easiest materials to recycle. In addition to known users of these materials, or those who have expressed an interest in such products during our original interview, there are a number of competent, dependable chemical brokers in the San Francisco Bay Area who are delighted to take these so-called waste materials off the hands of the generator. Usually they are able to purchase these products at discount rates.

Many drums of useful chemicals are discarded on a regular basis. Why are they being discarded? Many times the products are "outdated" or have been discovered during a clean-up or have been stored for a long period of time and are being disposed of because they are no longer of value to the owner.

A frequently encountered reason for disposal is the very tight quality-control restrictions that are imposed by some industries. This is especially true of the food and semiconductor industries where chemicals of generally acceptable quality are discarded because they cannot meet the very tightly

controlled standards of these industries. These materials are discarded rather than returned for credit because the producer does not want to risk contamination of future batches of the same product.

In the second category are processing wastes that are reusable without treatment. These are waste materials that can be reused as industrial feed stocks *per se*. In this category belong the cardboard for pulping copper, and other metal solutions for metal recovery, certain solvent streams, and a diversity of other materials. They also include filter charcoals, oils that can be used for fuel, used diatomaceous earth filter cakes which provide siliceous materials for cement manufacturers, a variety of valuable metal materials, and sludges which sometimes may require simple separation from water suspensions.

Caution is required to assure that these materials, when reused, will not cause untoward effects. For example, cardboard is repulpable and is commonly repulped to make more cardboard. However, if the cardboard is contaminated with polychlorinated biphenyls (PCB's), pesticides or chemicals, the new cardboard should not be used for food packaging, but it can be used for other purposes such as the manufacture of concrete foundation forms.

Another example of "reusable without treatment" waste involves a paper recycling company which has a certain percentage of paper that is not repulpable. This they biodegrade to make a loam used in lawn preparation. During our interview, it was brought out that they would really like to make a complete fertilizer by the addition of nitrogenous and phosphorous materials. Tanneeries produce a highly proteinaceous material from their de-hairing process. This is difficult to dispose of since it contains caustic sodium sulfides and undissolved hair as well as various other proteinaceous organic materials. The tannery oxidizes the waste to convert the sulfides, neutralizes with sulfuric acid, and sends the products to a disposal site.

This material is ideal as a nitrogenous soil amendment when used with the biodegradable paper loam. We suggested that the tannery contact the paper company for disposal. The tannery volunteered to use phosphoric acid in place of sulfuric acid to neutralize the alkalinity and upgrade the nutritional value of the soil amendment.

There was only one catch. The distance between the two sources was too far and the sales price of the product could not justify the transportation costs. This brings us to another point. Resource recovery and recycling would be greatly aided and abetted if more stringent restrictions were put on disposal and the cost of disposal increased.

Opportunities are plentiful

A good example of the successful recycle of a waste product is "galvanizers pickle acid." This material contains about 8-10% zinc sulfate as well as some iron salts. It can be used as an agricultural additive in areas deficient in zinc; it is commonly used in citrus orchards.

The pickle acid can be fortified with baghouse dust produced by some scrap steel processors. Baghouse dust from this source contains as much as 25% zinc oxide. So this material in conjunction with more waste sulfuric acid is used to increase the zinc sulfate concentration in "galvanizers pickle acid." Higher concentrations are more amenable to the recovery of solid zinc-iron sulfate by a dehydration process. This process is presently in operation in California.

Another "steel pickle acid" contains 10-15% ferrous sulfate. This product is being used to treat the steam being used to develop electrical power in the geothermal area around Calistoga. The Air Pollution District in that area

does not allow venting of the hydrogen sulfide in the steam, so it is treated with ferrous sulfate solution. A sludge consisting of iron sulfide and elemental sulfur is recovered, which in itself is useful as a soil amendment in many areas.

These and other developed uses have created a shortage of "pickle acid" in the Bay Area. Now that is pretty unusual! A shortage has developed for a material which at one time was a prime pollutant of the rivers and the bay of this area.

Opportunities for recycling waste are manifold and pop up in many strange places. For example, a relatively small company is involved in the business of recovering metals such as nickel, copper, and some gold and silver from waste streams arising from an ammonia copper solution waste produced by printed circuit board manufacturers.

A caustic waste stream containing sodium sulfide is produced by a nearby refinery. Both the metal-containing waste and the sulfide-containing waste are considered hazardous waste in California and require rather costly disposal in our Class I disposal sites.

The treatment of the metal-containing solution with the sulfide caustic precipitates the heavy metals which are recovered. The amount of heavy metal remaining in residual waste is at a concentration which allows disposal to the sanitary sewer system.

The third category of wastes have potential use, but require some ingenuity or inventiveness to convert them to useful materials. These are usually disposed of by using the alternate methods approach. One example involves the semiconductor industry, which produces a large amount of acid stripper, a mixture containing 96% sulfuric acid, and 2% chromic acid. It's the bane of the industry and is usually buried. This material can be used for refining used crankcase oil. Used crankcase oil contains heavy metals such as lead, calcium and barium, so adding a little bit of chromium isn't going to do any harm. The oil and waste acid are mixed and allowed to separate into sludge and treated oil. The sludge is very acidic and normally contains about 10 000-20 000 ppm lead and varying amounts of other heavy metals. But now we have enriched it with 2% chromium.

The problem now is to separate the metals from the acid sludge. If we neutralize the acid sludge with ammonium hydroxide, we make ammonium sulfate, a marketable agricultural fertilizer. The fertilizer can be sold directly or returned to the am-

monia producer for credit, and the filter cake, which contains a rich concentration of heavy metals, primarily lead and chromium, can be profitably processed for metal recovery. Recycling possibilities such as these are at hand. The problem is getting somebody to do it.

Another tough example of a waste needing innovative thinking is a waste mixture called mixed acid etch. The etch is used in the semiconductor industry to process so-called silicon wafers. It should be called "the seven-year-etch" because it just doesn't go away. This material contains 60% nitric acid, 20% hydrofluoric, and 20% acetic acid. This waste is extremely dangerous, but when handled correctly, "it just lays down and rolls over."

The secret is to mix it with lime or acetylene lime plus calcium hydroxide - a waste stream coming from the manufacture of acetylene from calcium carbide. Lime neutralizes the acids and, after treatment, we have a solution containing calcium nitrate, calcium fluoride, and calcium acetate. Calcium nitrate is a first-class fertilizer. It commands a premium price and is used on golf courses and by lettuce growers.

The second useful product generated by this process is calcium acetate. The calcium acetate in the neutralized acid etch behaves in a manner similar to lime or gypsum in the soil, but is fast acting because, as a liquid, it penetrates the soil better than gypsum, which requires tilling to be effective.

The third useful product generated by this treatment is calcium fluoride. This material is useful in cement manufacture and as a raw material for hydrofluoric acid manufacture. In the latter use, high-grade calcium fluoride brings \$200-300 per ton.

The last category involves those materials that no one wants to recover. This category includes chemical carcinogens, polychlorobiphenyls (PCBs), dibromochloropropane (DBCP), DDT, and other materials, which, when buried, wait in their subterranean lair for the opportunity to rear their ugly heads and plague our environment sometime in the future. These materials should be destroyed in an incinerator capable of eradicating them forever. But even these materials, if properly handled, can be of some value as fuels.

PCBs and DDT solutions can be incinerated in cement kilns, which are ideal for this purpose. The flame temperature of the kilns are in excess of 2000 °F and the residence time is long. The hydrochloric acid that results

from the burning of these chlorinated materials reacts with some of the limestone that is used to make cement. This reaction has the desirable effect of reducing the free alkalinity in the cement, and the calcium chloride that is formed is useful in controlling the set time and temperature of the cement.

A one-man effort

As previously stated, the Department of Health Services' Waste Recycle Program has been a one-man pilot effort in San Francisco Bay Area. The primary approach has been detailed technical personal interviews with industries. This is a time-consuming job, but it is more productive than questionnaires because it allows the interviewer to follow unexpected leads as they are generated. A low-key, fee-free state-controlled waste brokerage office can be greatly instrumental in forestalling the tremendous amount of waste that is now going into disposal sites.

The State of California has enacted a law, AB 1593, which among other provisions, requires the disposer to justify not having recycled recoverable, useful waste products. It also mandates the recovery and recycle of usable materials whenever it is economically possible. Chapter 6.5, Article 7, 25170 of the California Health & Safety Code calls for the investigation of the market potential, and the feasibility of using hazardous wastes and the recovery of resources from hazardous wastes. The law further addresses itself to the promotion of recycling and recovery of resources from hazardous waste, and to the establishment of a clearinghouse to assist in the recovery of useful wastes.

It is clear that California is intent on applying a program that has been demonstrated to offer great incentives for conservation and environmental protection, as well as economic profitability for those who participate. The initial success of our low-key efforts assures us that the goals of the Lockyer Bill, AB 1593, will be attained.



Carl G. Schwarzer is a waste management specialist with the state of California. He has been involved in the development of a program for reusing industrial discards. Coordinated by LRE

Senator CHAFEE. Now Mr. Krefting. You are from the Sierra Club, Mr. Krefting?

Mr. KREFTING. Yes, Senator Chafee.

Senator CHAFEE. Fine.

STATEMENT OF STEVE KREFTING

Mr. KREFTING. The disposal of toxic wastes is a vast problem that has been created by shortsighted management and which has only recently gained recognition, and then only by poisoning the citizens of Niagara Falls. Since that occasion, we have had studies that have revealed that there are an estimated 51,000 sites existing across the United States.

Of these, it is expected that at least 2,000 may cause serious environmental and health damage within the next 3 years. Yet, in EPA's office, out of the 1,700 people they have in their enforcement division, only 34 people work on toxic materials. That seems extremely inadequate for policing the number of sites involved.

None of them have law enforcement training. So far only one case has been submitted to the Justice Department for prosecution, that being the infamous Love Canal.

This is a national emergency. The health of our citizens is at stake. Congress must take immediate, far-reaching and farsighted action.

On March 6, 1978, at 4 a.m. in Riverside, Calif., a flood of 1 million gallons of water containing salts, heavy metals, and at least 30 known carcinogens was released from a chemical dump site. This was due to heavy rains and the possible bursting of the dam.

It flooded school land, residential streets and yards, farmlands and pastures up to 3 miles away from the site. Eventually it flowed into the Santa Ana River, contaminating the freshwater and marine ecosystems. A new housing development is being built on land which still contains high levels of carcinogenic chemicals left over from the flood.

A high rate of leukemia has been noted in the area's cats, along with increased rates of illness among the residents and inexplicable changes in the color patterns of cows feeding in contaminated pastures.

In humans, cancer can occur 20 to 30 years after exposure to a carcinogen. If we do not do something now to correct these problems, we are sentencing innocent citizens to death.

At an Occidental chemical plant in Lathrop, Calif., pesticide wastes have been disposed of in onsite, unlined pits. Included in these wastes is the nematocide DBCP, banned in California 2 years ago when it was discovered to cause sterility in workers. Occidental officials discovered 4 years ago that their wastes had contaminated area wells. Yet they did not warn the area residents drinking from the wells and they did not notify the state.

This situation is a common theme. In so many cases companies have known about the dangers of the chemical wastes and they have known about contamination resulting from improper disposal. Yet they have placed the burden of these costs on innocent citizens.

A superfund for toxic waste disposal therefore must be industry financed. Industries have profited from these inadequate past practices for too long. The fees collected after an initial Federal startup

should be collected from oil production and organic and inorganic chemical products.

These costs should be borne by the upstream end, producers, rather than the downstream end, disposers, as these producers are the people who reap the primary benefits of improper disposal, such as lower costs.

This fund should pay for the cleanup of abandoned, existing and future sites where necessary. However, owners and operators of disposal sites must be strictly liable. They must pay for damages if they can before the fund is tapped.

Senator CHAFEE. You heard the testimony from the gentleman from Chevron who said that he felt it was unfair to make the chemical company or an oil company pay to clean up abandoned sites. What is your reaction to that?

Mr. KREFTING. I feel that the abandoned sites, like I said earlier, these are things that have benefited oil companies and chemical producers in the past by lowering their costs. They just go and dump it in a field or pit.

Senator CHAFEE. All right. Take the case of a new chemical company that wasn't around when the deeds were done. What is your view on that?

Mr. KREFTING. I think it is something like we have in civil rights with discrimination. We have taken on the past sins of the country by trying to alleviate those sins by such programs as affirmative action. You know, it might be hard to distinguish, but I have a feeling that if we try to set up a separate fund for every type of thing, a separate fund for abandoned sites, a separate fund for chemical spills, abandoned waste sites, then you will get complaints from the oil companies that we have too much government again.

I think to simplify matters it would be a most efficient procedure to have a single fund.

Senator CHAFEE. All right. Why don't you go ahead.

Mr. KREFTING. This fund also should not just pay for the containment and cleanup costs, but it also should cover property damage and health effects.

This is not, I would say, that we shouldn't look for cancer in this. As I said, there is a 20 to 30 year—cancer would be impossible to put into a category like this. There have been cases like the Love Canal where there have been immediate health effects.

Three hundred and forty-four million tons of toxic waste are produced yearly. If waste producers bear the cost of their own waste generation, this will provide an economic incentive for research into waste recycling, as well as eliminating the economic gains of fly-by-night dumping operations.

I thank you for the opportunity to speak.

Senator CHAFEE. I am not sure I agree with the last point. You say that if waste producers bear the cost of their own waste generation, this will provide an economic incentive for research into waste recycling. You mean by the waste producers?

Mr. KREFTING. Right.

Senator CHAFEE. Then you say as well as eliminating the economic gains of fly-by-night dumping operations. Explain that, could you?

Mr. KREFTING. That is probably the weakest point in there.

Senator CHAFEE. I won't hold you on that too closely, then. But it seems to me I wouldn't have ended up with my weakest point, I don't think, in preparing my presentation.

Mr. KREFTING. I apologize.

Senator CHAFEE. You have some good points in here. We appreciate your coming. It does seem to me that of course all through this when you put onerous burdens on, you increase the need for the very law enforcement that Miss Siri was talking about. I don't know whether you have been in the Bronx on the east coast lately, but because of the problems of disposing of garbage, going to certain places, apparently the trucks have just come and dumped it right along 95. If you have ever driven 95, as you come south into New York, it is just astonishing. Apparently trucks just back up and dump the garbage right there.

So it seems to me we have to be very much on the alert for the incentives for fly-by-night dumping operations. A few barrels here and a few barrels there, as was discussed, in the lower 40 somewhere. So we have this stuff all over the place.

We thank you for coming.

You would have a penalty for failure to notify of a toxic release?

Mr. KREFTING. Yes, I believe so. There seems to be much more to this issue than just the factor of paying for the costs of cleaning up abandoned dumps or potential dump problems. We have serious problems in the enforcement area as far as that not only does the free enterprise system work against safe disposal, but it is also working against any knowledge at all of where toxics have been dumped and the different methods of disposing of them.

Senator CHAFEE. I think you discover in this that to a great extent the people who perform, do the best job, are frequently the larger and the more, well, you call them responsible because they do the best job, but the wealthier companies like DuPont, and the ones who misbehave are these fly-by-night operators that you are talking about who do provide jobs nonetheless they are worse violators.

We thank you very much for coming. I am interested in these activities obviously, and in all of the activities of the Sierra Club.

Mr. KREFTING. Thank you.

Senator CHAFEE. Now we have another group of Californians dealing with the health end of the matter. Dr. Robert Cooper, professor of environmental health sciences, from the School of Public Health, University of California, Berkeley; Dr. Donald Whorton, professor of environmental Health sciences, school of public health; and Dr. Robert Spear, professor of environmental health sciences, School of Public Health, University of California, Berkeley.

Gentlemen, we are glad you are here. Go right ahead.

STATEMENTS OF ROBERT COOPER, PROFESSOR OF ENVIRONMENTAL HEALTH SCIENCES, SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF CALIFORNIA, BERKELEY; DONALD WHORTON, PROFESSOR OF ENVIRONMENTAL HEALTH SCIENCES, SCHOOL OF PUBLIC HEALTH; AND ROBERT SPEAR, PROFESSOR OF ENVIRONMENTAL HEALTH SCIENCES, SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF CALIFORNIA, BERKELEY

Mr. COOPER. Senator, my name is Robert C. Cooper, for the record. I am professor of environmental health sciences at USC, Berkeley. We have prepared a brief statement jointly rather than three separate statements.

Senator CHAFEE. Excellent.

Mr. COOPER. Our interest being in public health is mainly human health rather than flora and fauna that we have been hearing about this afternoon.

As you are well aware, the problems associated with determining the effects on human health that result from environmental contamination are difficult from a qualitative point of view and enormously difficult in any quantitative sense.

It is, however, becoming increasingly clear that quantitative estimates of disease risk from exposure to these pollutants are the essential issue. This is because almost any physical, chemical, or biological agent is harmful to human health if sufficient dose is delivered to the critical site in the human body. In this respect, even water is potentially toxic, certainly if the grounding is lethal.

The important variables linking the presence of an environmental contaminant to health effect are: (1) The route and degree of human exposure, (2) the duration of the exposure, (3) the dose delivered to the critical receptor site within the body, and (4) the dose-response relationships.

Senator CHAFEE. What does that last one mean?

Mr. COOPER. I guess basically how much does it take to make you ill? What is the effective dose? This enters into questions of whether there is a threshold, acceptable levels, and so forth.

Quantitative estimates of exposure are frequently difficult to determine in any defensible way. A major problem in determining dose-response in a population exposed to environmental contaminants is that the dose at any given time is usually very low and the response chronic and delayed. As I say here, we are really addressing the chronic exposures, the exposure of very concentrated materials, well waters and the environment in general, rather than major spills and this sort of thing where some may have a whole tank of this material dumped on them.

A major problem in determining dose-response in a population exposed to environmental contaminants is that the dose at any given time is usually very low and the response chronic and delayed. Thus, establishing cause and effect becomes extremely complex.

The determination as to whether chemical or biological materials in the environment are agents of disease in humans is notoriously difficult. The dose-response information is usually gained by the extrapolation of data obtained from high-dose animal exposure to the statistically anticipated response at low environmental doses,

followed by the assumption that test animal responses are equivalent to human responses.

In addition, there are problems in defining the effects of varying susceptibility within the exposed population. For example, children, pregnant women, and the aged frequently face higher risks from a particular level of exposure than does the remainder of the population. Despite these difficulties, it is essential to quantify risk from exposure to hazardous agents in our environment.

We feel that a major goal for the scientific community is to determine the risk involved upon lifetime exposure to various low doses of contaminant. With such information the body politic can make rational risk-benefit judgments, determine acceptable levels of exposure, and intelligently determine the proportion of our scarce resources which should be devoted to diminishing the risk to the public health.

Developing an understanding of the basic toxicology of materials released into the environment is of obvious fundamental importance. However, coupled with such an understanding must be knowledge of the fate of toxic or potentially toxic materials when they reach the environment.

The degree of stability/persistence of these materials in air, water, and soil and their ability to be transported through the environment is, of course, of considerable importance in evaluating their public health impact.

The phenomenon of biological or chemical transformation of materials of no, or very low, toxicity to toxic materials during their residence in the environment can certainly play a role in the hazard imposed. Examples of this phenomenon are the methylation of mercury in estuarine sediments, the environmental oxidation of the pesticide parathion to paraoxon, its highly toxic analog, on the foliage and in the soil of orchards and groves and the complex atmospheric reactions involved in both photochemical and sulfurous air pollution.

Bioaccumulation of toxic chemicals and infectious agents such as that of heavy metals in high trophic levels of the food web and the concentration of infectious bacteria and viruses by shellfish grown in contaminated waters is also an important consideration in the evaluation of the impact of toxic material upon the health of an exposed population. The lesson to be learned is that to predict or determine the health effects of the release of potentially hazardous substances into the environment is extremely complex.

The following are two examples of recent experience with the release of potentially hazardous materials into the California environment, one of which has been mentioned many times today.

The first one we put here is herbicide spraying, especially with phenoxy herbicides, which has been extremely controversial since the U.S. military's use of agent orange in Vietnam. Recently, in California, there have been considerable investigative press reports about an apparent increase in birth defects, spontaneous abortions, and infertility in Humboldt County, a county in which 2,4,5-T has been extensively sprayed on forests. We now know that 2,4,5-T is contaminated with dioxin, a powerful carcinogen and mutagen.

Although the concentration of dioxin is small, especially compared to that in agent orange, we do not know what effects this has

on humans, the reason being that careful scientific studies have not been done to verify or refute the press reports. Although the EPA has banned aerial spraying of forests in California, the studies need to be done to buttress industry complaints of arbitrariness of governmental action.

Dibromochloropropane is a nematocide widely used from 1958-77 when its use was suddenly prohibited or restricted due to its adverse effects observed in male production and formulation workers. It has also been shown to be an animal carcinogen in two animal species, as well as a bacterial mutagen, in the Ames Test.

The following studies have not been done: (a) a fertility outcome study among exposed workers and spouses—

Senator CHAFEE. What does a fertility outcome study mean? What is the difference between a fertility study and fertility outcome study?

Mr. COOPER. I will defer to Dr. Whorton.

Mr. WHORTON. A fertility outcome study in this sense means people who want to become pregnant, what happened; when they did become pregnant, what happened to the pregnancies; and the children who were born normal and abnormal.

Mr. COOPER. The second one was a cancer morbidity or mortality study to specifically evaluate its possible neoplastic effects in humans.

During the past 2 months, studies of well water in California have shown that trace amounts are present in 35 percent of the tested wells. The obvious question is: What is the public health hazard from small amounts of DBCP in the public water supply? In addition, what advice should be given to the people potentially affected?

The answers are difficult, in that there are no studies of either fertility outcome or neoplasia among the high-exposed group. Thus, in the absence of valid data, it is impossible to extrapolate from the high-exposed to the low-exposed population.

It can come as no surprise that the testimony of scientists raises more questions than it resolves. We can always be relied upon to say, and say sincerely, that more research is needed.

However, given the pace of technological change, we must face the fact that it will probably never be possible to completely eliminate adverse impacts on human health resulting from environmental contamination. That is not to say that we cannot do a better job nor that we should not continue to strive for the prevention and elimination of adverse health effects due to the release of hazardous materials into the environment.

In particular, we feel that research and development should be promoted in the following areas:

One. Research should be done in new approaches to medical, health, reporting. Because of the complexities of determining health effects from low levels of exposure to environmental hazards, epidemiological methods will frequently be required to establish cause and effect relationships. Essential to such activity is the availability of accurate and complete morbidity and mortality disease data for the exposed community.

At present, such information, especially morbidity data, rarely exists. We usually have more mortality data because it is hard to

die without being recorded. That also only talks about the cause of death itself.

Recently we have completed a preliminary study which associates asbestos in drinking water with a small increase in cancer at selected sites among those exposed. Such a study would have been impossible without the existence of a tumor registry. This latter is a very special health reporting system which exists in only a few areas of the United States.

Certainly we should be able to develop something like, for lack of a better thought, a "Neilson"-type survey with which we could accurately estimate the morbidity of disease in our country.

Two. We urgently need to develop acceptable and uniform methods for ascertaining the health risk of exposure to various levels of biological and chemical agents.

Three. Research is needed to develop methods for quantitating exposure of populations; that is, what dose are individuals in a community receiving.

Four. We need to develop better means for predicting the health impact of the use of newly developed chemical compounds or mixtures before it becomes a problem rather than dealing with it retrospectively. Such means include predictions concerning possible transformation, translocation, and bioconcentration of these materials when they enter the environment.

Five. Acceptable methods for the containment and/or treatment of hazardous materials must be continuously developed from both a technical and administrative point of view. The availability of such methods should be a component in the evaluation of the proposed use of hazardous compounds.

Mr. COOPER. As I say, these comments are respectfully submitted to your committee.

Senator CHAFEE. That is very thoughtful. I think you have put your finger on a number of problems that we are wrestling with here. As you say, just about anything can be said to be toxic, and particularly in the synergistic effect, as we discussed earlier.

Who should do all of this research, do you think?

Mr. COOPER. I will relay that across the Bay.

Senator CHAFEE. Berkeley, through a series of Federal grants?

Mr. COOPER. Of course. Sure.

I don't know how to answer you directly. I think it certainly should be funded most probably by—we are funded to some degree now in my own case by primarily the State itself, various agencies within the State. Our asbestos study was funded by the Environmental Protection Agency. I think many of these studies are very expensive. Since this is not limited to California as a problem, I think it should be obviously a Federal source of funding.

Mr. SPEAR. If I may speak to that particular point. I think one thing that would be very helpful is to further develop relationships between the people who face the problems in the local areas and the people with research expertise to bring to bear on the problems.

We are trying to do something along those lines here in California in the area of occupational health where we are trying to bring to bear the university's resources in conjunction with the State regulatory agencies and in conjunction with both industry and

labor so that the research community can really come into closer contact with the realities of life.

I think the same notions could be extended to these other areas as well where it is a closer collaborative arrangement. And who exactly pays for it is an important issue, but perhaps not the critical one.

Senator CHAFEE. When you say the people affected, are you talking about the oil companies or are you talking about the consumer?

Mr. SPEAR. I was thinking specifically of the agency who is responsible for dealing with the particular problem and protecting the public health or the fisheries or whatever. There is always an agency that catches the flak for this. Very often this agency has no where to turn, at least immediately, for technical assistance. I think this is an area which would be well worthwhile to explore.

Senator CHAFEE. Can you ever tell in advance what the risks are proposed by a particular chemical, or do you always have to do it based on experience afterwards?

Mr. SPEAR. I think one thing you can do, there is an increasing body of methods available for looking at inherent toxicity, carcinogenic potential, that sort of thing. But an area that is just now beginning to be addressed is the question of exposure.

We know chemicals are toxic. The issue is how much of it actually gets to the population. That is one issue that I think presently impedes our ability to make predictions with any degree of certainty.

The second issue, and I think one that was addressed in the testimony, is this question of environmental transformation. It is a very different thing to talk about exposure of workers in a factory when you know what they are dealing with. It is something else again when you distribute chemicals into the outdoor environment. There is a tremendous potential for biotransformation, accumulation, and very frequently we find that the chemicals that then are responsible for injuring the public health are not the original chemicals but breakdown products or some transformed material.

In that case, I think that is an enormously difficult area to make predictions in and one reason why you should perhaps be even more careful about what you dump into the outdoor environment than what might be used in other circumstances where there is not the potential for conversion or accumulation.

Senator CHAFEE. Can you draw a cause and effect relationship between a chemical and an injury or do you work on probabilities that there is x percent chance that the injury was caused by the chemical? Then when you do that, what do you do about the victim's expenses?

Mr. WHORTON. I think the best answer to that would be to look at cigarette smoking. While we know that people who smoke cigarettes have much higher incidence or risk of developing lung cancer, heart disease, or emphysema, not everybody who smokes develops every one of the diseases. So by smoking you may increase your risk to develop the disease.

I think the same is true with a lot of chemicals or any infectious agents. It is not everybody becomes sick by that agent, unless it is such a high dose everybody dies from it. Then it is real easy. But,

on the other hand, when you are talking about chronic exposure, especially the lower doses, a lot of other things may be happening as well, then you are talking probabilities in most cases.

Senator CHAFEE. How do you rate all of this? All of you are in the school of public health at Berkeley. How do you rate these problems as we face the public health problems of the eighties? Do you rate this as a serious one, chemicals, hazardous wastes on the land, or do you put it down much farther compared to the normal problems you deal with, such as heart disease and many problems such as that, well, cancer, that comes from smoking and so forth?

Mr. WHORTON. I think one concern is if you look at what has happened since World War II in the amount of synthetic chemicals that have been produced, and the amount of synthetics used in the environment and therefore going into the environment, and you look and see they have varying sorts of toxicities, plus if you go to the fact that many cancers don't develop until many years after initial exposure, one has to be very concerned. I think that we may be paying in the next 10 or 15 years for many of the mistakes we made in the past. I certainly think this is more important than new avenues for controlling infectious diseases, for example.

The heart disease rate now in the United States, if you look at the latest statistics, is going down, as compared to other diseases.

Senator CHAFEE. It is going down in comparison to itself, isn't it?

Mr. WHORTON. In comparison to itself. But you compare it to the death rate, so you compare it to other disease, too. But it is down in comparison to itself.

If you look at cancer, the cancer rate overall has stayed relatively stable, except for lung cancer. Lung cancer has gone astronomically high, especially since the thirties, in men, post-World War II, and females. Exactly what is going to happen is unclear, but I think I would be very worried.

Senator CHAFEE. Thank you for coming.

I would like to thank everybody who has both participated and sat here patiently. This closes our hearings. We have been here to get the thoughts of those here on the west coast. Our hearings have not previously been held here on the west coast. It has been very helpful. I don't think we have ever gone as much into depth on the damage assessment matter. We are grateful to all of you for appearing. Thank you.

[Whereupon, at 4:25 p.m., the subcommittee was recessed, to reconvene subject to the call of the Chair.]

[Statements and other material submitted for the record by today's witnesses follow:]

Statement of Peter H. Weiner, Esq.
Special Assistant, Governor's Office

Senator Chafee, on behalf of Governor Brown I would like to welcome you and the subcommittee staff to California.

As a nation, and as a planet, we face an historic moment of responsibility. Our health, our environment, and the genetic rights of future generations are increasingly compromised by a rising sea of chemicals. They spill forth on highways, in industry, and from abandoned chemical dumps hidden next door to homes, parks, and even San Francisco Bay. We must act now to prevent future releases, clean up old ones, and assist those who have been injured.

California is justly proud of its leadership in regulating disposal of hazardous waste. But we readily acknowledge the need for greater efforts.

We have greatly appreciated your consistent attention to these problems, and welcome the opportunity to testify before you today.

We are encouraged that the Carter administration has recently recognized the need for further legislation in this field. The failure to implement existing environmental statutes has contributed to the need. Thus we have no necessary regulations adopted to implement Section 311 of the Clean Water Act or Sections 3001-3066 of RCRA. Unconscionable delays in regulating the basic production of hazardous materials exacerbate an already serious problem. For example, EPA's pesticide RPAR program was described by an EPA official in yesterday's Los Angeles Times as "so riddled with roadblocks it is virtually impossible to do anything."

But the problem is there, and legislation is certainly needed. Although some of the Carter administration's proposals, as we understand them, are in keeping with recent developments in this field, other parts of the legislation are woefully inadequate. I shall comment upon those provisions in a minute. We look forward to working with this committee to design more cost-effective, comprehensive, and workable legislation.

EMPHASIZE PREVENTION

We are here today in large part to talk about society's failures: spills and abandoned dumps. But we would be remiss in not first stressing the need to emphasize the prevention of these hazards. Arriving with red lights and sirens after the house burns down is flashy, but futile. We must encourage safer procedures from the point of generation to the point of disposal. And we must prioritize our use of scarce public funds to strike first at those situations which endanger human health.

Prevention takes many forms. At the disposal end, Carla Bard will describe a system of waste disposal, siting, waste permits, and assurances of future site maintenance and responsible closure, which we believe will go a long way to prevent future Love Canals. And Harvey Collins will talk about our system of permits and manifests for hazardous waste generators and disposers, which we believe has enhanced responsibility in the waste disposal industry. Prevention should also emphasize minimization of human and environmental injury when spills do occur. We need better identification of chemical cargos and hazards on trucks and increased training of police and fire personnel in hazard identification and treatment.

In the long run, we must look to solutions which reduce our production of hazardous waste and reduce our reliance on landfills for their disposal. These solutions include incineration of waste, recycling and recovery of resources before they leave the producer, and the substitution of safer substances for those used now. It can be done. But it takes American technological ingenuity and scientific expertise. Scrubber technology for controlling airborne contaminants is one success story. The ability to use polyvinyl chloride without the carcinogenic monomer--once thought by industry to be impossible--is another. Short term tests for mutagenicity, such as the Ames test or sister chromatid exchange, are used by industry and government alike to screen chemicals for potential carcinogenicity. They may be an important third success story in helping to eliminate or use safely that small percentage of substances which endanger all living things by tampering with DNA.

In structuring a liability and compensation system for current problems, we start from the premise that such a system must provide incentives for prevention: for technological and scientific innovation; for research to assess the true hazards posed by individual substances or specific releases; and for sufficient information-sharing and training to help individual citizens and affected personnel make responsible decisions about their lives. Throwing money into dumps and spills alone is indeed only throwing good money after bad.

LIABILITY, COMPENSATION, AND FUNDING
FOR DAMAGES CAUSED BY HAZARDOUS SUBSTANCES

We support a comprehensive bill which addresses liability, compensation, and funding for damages caused by releases of hazardous substances. So long as it would not preempt better state provisions, it would greatly assist us in mitigating and compensating for damages caused by releases, and in establishing firm standards of liability for all wrongdoers.

Coverage

First, we believe that such a bill should cover all injurious releases of hazardous substances regardless of the type of release. It is time that we stopped treating the world as if reality were compartmentalized according to bureaucratic pigeonholes. For example, Occidental Chemical Company was tragically aware of the dangers of DBCP no later than July of 1977. It was then that their manufacturing workers were discovered to be sterile. Yet Oxy did nothing to test the effects of its product on pesticide applicators; taxpayers paid for that. And Oxy continued to fraudulently conceal its discharge of DBCP into well water, knowing its carcinogenic and sterilant properties. Civil as well as criminal liability for this latter act must be assessed in light of this total history. The bill's provisions should reflect this holistic treatment of company actions, and encourage a comprehensive investigation of firm practices. The Carter proposal, covering only spills and abandoned sites granted priority, is inadequate in this respect.

Scope

For purposes of liability, damages resulting from any substance should be actionable. Restriction to a list of

designated substances is neither administratively necessary nor desirable. DBCP would not have been on the list prior to 1977, for example. For purposes of reporting spills, we agree that the duty should be limited primarily to a list of designated types of substances, as a matter of practical necessity. In addition, reporting should be required for releases of any substance where adverse human health or environmental effects are observed. Similar reporting requirements now exist in FIFRA and TSCA. Where any such effects exist, reporting requirements should be uniform regardless of how big a firm is. The liability and reporting scope of the Carter Administration proposal, which is limited strictly to a designated list, has unfortunate limitations and built-in administrative bottlenecks.

Liability

Section 311 of the Clean Water Act, reflecting the common law's imposition of strict liability on owners of dangerous animals, provides a good basis for determining liability. We agree with the Administration that strict liability should be the standard in seeking recovery of damages from those who contribute to or cause a spill or abandoned site hazard. We also applaud the proposal's provision for holding former as well as current dump owners responsible when both helped cause the hazard.

Nevertheless, we fear that these theoretical solutions may sometimes become a cruel hoax for those who attempt recovery or those who hope that liability will encourage safer practices. We therefore suggest additional measures. First, corporate violators who do not provide adequate financial reserves to pay for damages are undercapitalized. The bill should provide for

piercing the corporate veil to establish individual liability of officers and directors. Second, individuals who do not provide adequate insurance or reserves should be treated like those who cause injury with malice. The liability established by the bill should not be dischargeable in bankruptcy. Third, so that half the damages paid by a business do not become a tax write-off, the Internal Revenue Code should be amended to prohibit listing such payments as a business expense. Fourth, we in California have recently stepped up criminal prosecutions against those who violate occupational health standards. We must insist that those who assault us with slow-acting poisons be treated as harshly as those who merely take our possessions. We recommend that adequate criminal penalties for willful violators also be built into this bill.

Damages

It is in its limitation of damages that the Carter Administration proposal is weakest. Indeed, the proposed act is weaker than any bill proposed in the last few years. For spills, the bill provides payment for cleanup, restoration, damages to property, and loss of opportunity to harvest marine life. For dumps, only cleanup and containment are covered. Mr. Costle has noted that private litigation is slow, costly, and often futile, yet the bill contains neither compensation nor rights of action for medical expenses, economic losses, property damage caused by abandoned dumps, or damages to natural resources.

We believe these damages must be included in the bill. It is only just that companies pay fully for the damage they cause. And it would be-ironic to pay for containment of wastes remaining

in the dump site, yet deny payment for direct injuries already caused by releases, such as medical expenses and cleanup of contaminated homes and farms.

It is especially essential that the bill provide for recovery of environmental damages, which otherwise may be difficult to obtain in some courts. These damages should measure the full extent of our societal loss when plants and wildlife are killed, when ecosystems are crippled, and when the environment is so disturbed that its human use value is severely diminished. We categorically reject the notion that environmental damages can be evaluated only by commercial standards. Only a full measure of damages will encourage responsible action to preserve this planet for our children's children to enjoy.

A flexible rulemaking mechanism, such as contained in the Chafee amendment to last session's S.2900, should be adopted to facilitate damage valuation. In California, as later state panelists will describe, we have been quite successful in developing environmental damage assessment mechanisms acceptable to the courts. These deserve your consideration in structuring a damages provision in the bill.

Causality

Many toxic substances do not cause acute effects at low dosages, but do cause cancer or mutations decades or generations later. Sometimes a disease is traceable to individual substances, such as the relationship between asbestos and mesothelioma. More often, a disease or environmental damage could have been caused by any one of a number of substances, all of which may have been mixed at one disposal site. It is therefore often

difficult to prove that a specific release caused a specific injury, according to traditional common-law standards of proximate cause. Yet there are times when common sense leads us to conclude that a specific site, such as Love Canal, has caused the injuries suffered by so many people living near it.

It is vital that this bill attack this knotty problem in two ways. First, we urge substantial funding for epidemiological, laboratory, and field research to assess the human and environmental hazards posed by specific substances or specific sites. We in California have recently embarked on an ambitious training and research program for professionals able to accomplish these task, but federal assistances is also needed.

Second, to provide fair and expeditious compensation for the victims of such sites, we urge the inclusion of a provision in the bill that reflects a common-sense approach to causality and which takes into account the state of our scientific knowledge. Such a provision should enable injured parties to receive compensation for their injuries, according to state tort law, so long as a reasonable person would conclude that the relationship between a release and the injury is more probable than not, based on such evidence as a higher statistical incidence of such injuries around the site. Proving the exact identity of the injurious substance, its source, its pathway, and its etiological mechanism should not be a prerequisite to obtaining compensation.

Information Sharing and Enforcement

Federal standards and assistance must not trench on existing state liability and enforcement mechanisms so long as such mechanisms provide equal or greater protection. This bill should

assure that information received by federal authorities regarding toxic incidents shall be forwarded immediately to responsible state agencies. It is unthinkable that the Securities and Exchange Commission should have known for months about the deceit of Occidental Chemical Company, yet not inform state authorities of this fact.* Statutory and bureaucratic barriers also inhibit EPA's sharing of sensitive information with the states. Trade secret protection and red tape must not stand in the way of protecting our people and the environment. We strongly urge you to eliminate these barriers as soon as possible. We would also welcome a provision giving EPA personnel direct legal enforcement authority. The ability of the agency to integrate compliance with legal action would result in quicker enforcement and more assistance in states with their own enforcement programs.

Funding

California has taken the lead in assuring appropriate funding for future site closure and maintenance. But we need a ready and dependable source of funds to solve the sometimes gigantic problems of cleanup and compensation posed by abandoned dumps and massive spills. Enterprise liability is one answer, but we should not be forced to find the guilty parties before taking emergency action to clean up or contain imminent hazards. Such a fund should also be available to compensate injured parties for medical expenses and property loss when compensation is unavailable from private sources, and should be used to encourage technological innovation and research.

* I have just learned that our Water Board asked the SEC several months ago for any relevant documents it might have. The SEC expressly refused to provide these documents. This behavior can only be described as appalling. We urge this Committee to assure that such behavior will not be repeated.

The source of this fund should be fees paid by the producers and primary users of hazardous substances. The concept proposed in the Administration bill is certainly one way to accomplish this. But it would be unjust to burden an already overtaxed public by providing any part of these funds from general tax revenues, as the Administration proposal would do. Products made from these substances should reflect their true costs. It is true that these costs will be passed on to consumers, but higher costs for these goods may encourage the use of economic substitutes made from safer materials. We also agree that a credit should be given to firms which recycle or reuse hazardous materials instead of producing waste.

Finally, we urge provisions to assure financial responsibility on the part of producers, transporters, and disposal operators. California already has such a law to assure responsible site closure. Firms should also be required to carry insurance for some degree of third party liability, such as medical expenses, property damage, and income loss.

Preemption

California has excellent liability and enforcement mechanisms already at work. We want help, not the obliteration of existing and effective programs. The Carter Administration proposal would preempt all parallel state programs for spills although not for abandoned sites. Preemption would seriously impede our enforcement efforts for years, while a duplicative federal bureaucracy become operational. Any weakness in federal legislation, such as limitations on damage claims, would leave California citizens worse off than before.

Moreover, there is no compelling need for preemption. State liability laws do not vary substantially. Even where they do, day-to-day operations of transporters and producers would not be affected, and double recovery would not be allowed. We therefore strongly recommend that no preemption of state programs be attempted, so long as the state programs provide equal or greater protection for humans and the environment.

Private Rights of Action

We look forward to the passage and implementation of this landmark legislation. But this is as much an era of limits for government as it is an era of possibilities for environmentally responsible growth. Realizing these limits, we urge that private citizens be granted an express right of action, including costs and attorneys' fees, to enforce the liability and compensation provisions of the bill.

Senator, thank you very much for the opportunity to testify before you today. Our other state panelists will now provide descriptions of specific state programs and prospects in this field. We in California stand ready to assist you and the committee in months ahead. Passage of the type of bill we have been discussing is in the interest of us all.

REGULATION OF HAZARDOUS WASTE
THE CALIFORNIA EXPERIENCE*

By

CARLA BARD, MEMBER
CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

THE STATE WATER RESOURCES CONTROL BOARD AND NINE REGIONAL WATER QUALITY CONTROL BOARDS CARRY OUT THE WATER POLLUTION CONTROL LAWS OF CALIFORNIA. FOR THE MOST PART THESE LAWS PARALLEL THE FEDERAL WATER POLLUTION CONTROL PROGRAM. IN EFFECT, CALIFORNIA RUNS BOTH THE STATE AND FEDERAL PROGRAM.

BOTH STATE AND FEDERAL LAWS ADEQUATELY DEAL WITH A LARGE PERCENTAGE OF POLLUTION PROBLEMS. HOWEVER, WE ARE FINDING SERIOUS PROBLEMS WITH SOME OF THE MOST DAMAGING DISCHARGES: TOXIC WASTES, PESTICIDES, HEAVY METALS, ORGANIC COMPOUNDS AND OTHER BYPRODUCTS OF OUR TECHNOLOGICAL DEVELOPMENT.

ONE OF THE GREAT NEEDS THAT EXISTS IN CALIFORNIA IS FOR THE SITING OF NEW CLASS I DUMPS. THE ONLY PLACE WHERE HAZARDOUS WASTES MAY LEGALLY BE DEPOSITED IS IN SUCH CLASS I SITES AND THERE ARE PRESENTLY ONLY 11 IN THE WHOLE STATE. IT IS ESTIMATED THAT THEY WILL BE FILLED TO CAPACITY IN A FEW YEARS; MEANWHILE IT IS IMPOSSIBLE TO FIND NEW SITES WHICH ARE PUBLICLY ACCEPTABLE. NO NEW CLASS I SITE HAS BEEN ESTABLISHED IN SEVERAL YEARS AND THE FUTURE IS BLEAK IN THAT REGARD. EVERYONE ADMITS THE NEED FOR SITES THAT ACCEPT HAZARDOUS WASTES BUT NO ONE WANTS A DUMP ANYWHERE NEAR HIS NEIGHBORHOOD.

*PRESENTED TO THE SUBCOMMITTEES ON RESOURCES PROTECTION AND ENVIRONMENTAL POLLUTION OF THE COMMITTEE ON ENVIRONMENTAL AND PUBLIC WORKS, U. S. SENATE, JUNE 29, 1979, IN SAN FRANCISCO, CALIFORNIA.

IT MAY BE THAT THE CALIFORNIA LEGISLATURE WILL HAVE TO GIVE AUTHORITY FOR CLASS I SITING TO THE STATE AND IT MAY ALSO BE NECESSARY THAT THE FEDERAL GOVERNMENT CHANGE ITS POLICY OF NO CLASS I SITES ON FOREST SERVICE OR BUREAU OF LAND MANAGEMENT LANDS. SINCE ABOUT 40% OF CALIFORNIA LAND IS UNDER THE AUTHORITY OF THE FOREST SERVICE OR THE BUREAU OF LAND MANAGEMENT, YOUR COMMITTEE MAY WISH TO EXAMINE THIS POSSIBILITY.

THERE IS NO WAY FOR ANY REGULATORY AGENCY TO ISSUE A CLEAN BILL OF HEALTH ON HAZARDOUS SUBSTANCES TO ANY STATE, REGION OR COUNTY WITHOUT A THOROUGH SEARCH AND SAMPLING PROGRAM. THIS IS THE PRICE WE PAY FOR PAST FAILURES TO CONTROL DANGEROUS MATERIALS. WE NEED TO DO SUCH A SURVEY IN CALIFORNIA TO IDENTIFY ABANDONED HAZARDOUS WASTE SITES. MERELY APPLYING REMEDIES TO PAST WOUNDS WILL BE FRUITLESS UNLESS WE ENSURE THAT A COMPREHENSIVE, STRICT AND EFFECTIVE CONTROL PROGRAM IS ON THE BOOKS. PARTS OF THAT SYSTEM EXIST TODAY, BUT I WILL SUGGEST SOME IMPROVEMENTS THAT CAN BE MADE USING SOME EXAMPLES OF HAZARDOUS WASTE PROBLEMS THAT WE HAVE EXPERIENCED IN CALIFORNIA.

STRINGFELLOW DUMP

FROM 1954-1972, JAMES A. STRINGFELLOW OPERATED AN INDUSTRIAL WASTE DUMP IN SAN BERNARDINO COUNTY. DURING THIS PERIOD, ABOUT 32 MILLION GALLONS OF ACIDS, HEAVY METALS, AND OTHER INDUSTRIAL WASTES WERE PLACED IN PITS. AFTER COMPLAINTS FROM RESIDENTS DOWNHILL AND DOWN-STREAM FROM THE PITS, THE COUNTY BOARD OF SUPERVISORS REVOKED A USE PERMIT, CLOSING THE SITE. CLOSURE BROUGHT UP SEVERAL SEVERE PROBLEMS.

THERE WAS NO WAY TO FORCE MR. STRINGFELLOW, OF THE STRINGFELLOW CORPORATION, TO TAKE ADEQUATE MEASURES TO SEAL THE PITS. BANKRUPTCY WAS MORE COST EFFECTIVE FOR HIM. LIENS ON THE LAND WERE POINTLESS; THERE IS VERY LITTLE VALUE TO A PIECE OF LAND THAT IS BASICALLY A TIME BOMB. THE COUNTY AND STATE HAD UNCLEAR AUTHORITY AND NO FUNDS TO SEAL OFF THE SITE AND ISOLATE THE WASTES.

AT STATE AND REGIONAL BOARD REQUEST, THE LEGISLATURE IN 1978, APPROPRIATED FUNDS AND AUTHORIZED CLOSURE AND MAINTENANCE OF THE SITE BY THE SANTA ANA REGIONAL BOARD. FOR THE LONG RUN, THE STATE BOARD ASKED FOR A PROGRAM TO MAKE OWNERS AND OPERATORS OF HAZARDOUS WASTE SITES RESPONSIBLE FOR CLOSURE. THAT LAW ESTABLISHES A SITE CLOSURE AND MAINTENANCE FUND DERIVED FROM FEES PAID BY OPERATORS AND OWNERS. THEY ARE ALSO REQUIRED TO FILE CLOSURE PLANS, INCLUDING HOW CLOSURE WILL BE FINANCED. RESERVE FUNDS OR BONDS MAY BE REQUIRED.

IN TERMS OF FEDERAL LAW, THE STRINGFELLOW SITUATION MAKES THE CASE FOR A SYSTEM OF PLANNING AND FINANCING CLOSURE WELL AHEAD OF NEED. IT ALSO POINTS TO THE DESIRABILITY OF A QUICKLY AVAILABLE FUNDING SOURCE FOR SOLVING PAST PROBLEMS. AND, PERHAPS IT ASSISTS IN BUILDING THE EVIDENCE THAT STRICTER DEFINITIONS OF LIABILITY ARE NEEDED. I HOPE IT HAS THAT EFFECT ON YOU. I AM HORRIFIED THAT A LITTERBUG FACES STIFFER PENALTIES THAN A HAZARDOUS WASTE SITE OPERATOR WHO TURNS HIS BACK ON A MAJOR POLLUTION PROBLEM.

ABANDONED MINES

ANOTHER AREA WHERE PAST FAILURES ARE CATCHING UP WITH US IS ABANDONED MINES.

THE NEW PENN COPPER MINE OPERATED ON THE MOKELUMNE RIVER, NEXT TO WHAT IS NOW LAKE CAMANCHE. THE LAKE SUPPLIES DRINKING WATER FOR MANY EAST BAY COMMUNITIES. THE REGIONAL BOARD STAFF INSPECTED THE AREA AND FOUND RAINWATER RUNOFF THROUGH THE COPPER SULFATE MINE TAILINGS, LEACHING HEAVY METALS AND SULFURIC ACID INTO THE RESERVOIR. BEFORE THE LEACHATE COULD CAUSE A MAJOR PROBLEM, THE REGIONAL BOARD, EAST BAY MUNICIPAL UTILITY DISTRICT AND THE CALIFORNIA CONSERVATION CORPS COOPERATED TO DREDGE BOTTOM WASTES AND DIVERT FURTHER RUNOFF TO EVAPORATION PONDS. THOUGH THIS IS A SUCCESS STORY OF INTERAGENCY COOPERATION, THE TAILINGS REMAIN AND SO DOES THE NEED FOR CONSTANT CHECKING TO INSURE THAT THE DIVERSION TRENCHES ARE WORKING.

THE CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD IDENTIFIES 40 INACTIVE OR ABANDONED MINES WHICH ARE POLLUTING SURFACE WATERS. SOME POISON THE WATERS WITH ACIDS AND HEAVY METALS.

CONTROL MEASURES WILL BE COSTLY. THE POISONS ARE FORMED BY THE INTERACTION OF AIR, METALLIC SULFIDES AND RAINWATER. CONTROLLING RAINWATER RUNOFF IS THE CHIEF METHOD OF CONTROL, ALONG WITH SEALING OFF HOLES, FRACTURE ZONES AND TAILINGS.

THE PRINCIPAL REASON STATE LAWS HAVE NOT BEEN EFFECTIVE IS THAT OWNERS OF INACTIVE MINES RESIST SPENDING MONEY ON PROPERTY THAT IS NOT PRODUCING INCOME. ONCE AGAIN, IT BECOMES CHEAPER FOR THE OWNER IF HE ABANDONS THE PROPERTY. THE TWO MAGIC INGREDIENTS REQUIRED TO ABSOLVE THE SINS OF THE PAST ARE MONEY AND STRICT LIABILITY.

STRIPED BASS

I AM SUBMITTING PICTURES TAKEN RECENTLY OF STRIPED BASS FROM SAN FRANCISCO BAY. I AM SURE YOU WILL SHARE MY DISMAY WHEN YOU REALIZE THAT THE HOLES THAT APPEAR IN THESE FISH ARE A NEW PHENOMENON AND APPEAR TO BE BECOMING MORE FREQUENT. THOUGH HEAVY METALS AND ORGANICS HAVE BEEN FOUND IN THESE AND OTHER STRIPED BASS, WE DO NOT NOW HAVE ALL THE INFORMATION THAT ALLOWS US TO POINT THE FINGER OF BLAME AT ANY ONE PARTICULAR CAUSE OR ANY PARTICULAR SOLUTION.

WE DO KNOW THAT YEARLY THERE IS A STRIPED BASS FISH KILL IN SAN FRANCISCO BAY AND THE DELTA, AT THE POINT WHERE SALTWATER MEETS FRESHWATER. WE ALSO HAVE STRONG EVIDENCE THAT THE STRIPED BASS FISHERY SUFFERS FROM PARASITES (54 PERCENT), DEFORMITIES (37 PERCENT) AND OPEN WOUNDS (35 PERCENT). BY THE WAY, THAT FIGURE FOR PARASITES IS FOR SERIOUS PARASITE INFESTATION, NOT THE USUAL LEVEL OF PARASITES FOUND IN STRIPED BASS.

I BRING UP THIS ISSUE IN RELATION TO HAZARDOUS WASTES EVEN THOUGH IT WILL BE AN ARDUOUS SCIENTIFIC EFFORT BEFORE WE ARE ABLE TO PINPOINT THE CAUSES OF THE PROBLEM, BECAUSE THERE ARE TWO ISSUES THAT THE STRIPED BASS SITUATION RAISES. FIRST: WE LACK KNOWLEDGE OF TOXICS TO SUCH AN EXTENT THAT GOVERNMENT DECISION MAKING ABOUT HAZARDOUS MATERIALS IS AN INTELLECTUAL DICE GAME. SECOND: THERE IS EVIDENCE THAT LEVELS OF POLLUTION BELOW WHAT WE DESIGNATE AS TOXIC CAN HAVE SERIOUS LONG-TERM EFFECTS, ESPECIALLY WHEN COMBINED WITH OTHER FORMS OF POLLUTION AND WATER QUALITY PROBLEMS.

MONEY IS THE ROOT OF ALL SOLUTIONS, AND MONEY FOR BASIC RESEARCH INTO THE SYNERGISTIC EFFECTS OF HAZARDOUS MATERIALS IN THE ENVIRONMENT IS NEEDED.

OCCIDENTAL CHEMICAL COMPANY

LASTLY, I WANT TO ADDRESS A CASE YOU MAY HAVE HEARD ABOUT THROUGH THE MEDIA. IT IS A CASE IN CALIFORNIA THAT IS BEING REFERRED TO PROSECUTERS FOR CRIMINAL CHARGES. WHILE IT MAY SEEM THAT THE CASE DEMONSTRATES THAT THE LAW CAN WORK, IT IS ONLY THROUGH FORTUITOUS CIRCUMSTANCE THAT THE INFORMATION CAME TO THE ATTENTION OF THE REGIONAL WATER QUALITY CONTROL BOARD AND WAS PUBLICIZED.

I AM TALKING ABOUT THE OCCIDENTAL CHEMICAL COMPANY FACILITIES IN LATHROP, CALIFORNIA, THAT MANUFACTURE PESTICIDES AND BEST BRAND FERTILIZERS. AFTER A CIVIL ENFORCEMENT ACTION WAS TAKEN AGAINST OCCIDENTAL IN MARCH 1979 BY THE REGIONAL BOARD, FOR DISCHARGE OF PESTICIDE WASTES TO GROUNDWATERS AND OTHER POLLUTION PROBLEMS, A SET OF MEMOS BETWEEN COMPANY OFFICIALS CAME TO LIGHT. IF THESE MEMOS ARE WHAT THEY APPEAR TO BE, THEY SHOW A PATTERN OF DELIBERATE ATTEMPTS TO MISLEAD THE REGIONAL WATER QUALITY CONTROL BOARD. THE MEMOS SHOW THAT OFFICIALS KNEW THEIR PESTICIDE PLANT WAS POISONING GROUNDWATERS, BUT DID NOT REPORT THAT FACT. NOR DID THEY REPORT THAT A DISCHARGE OF PESTICIDE WASTES EXISTED, AS REQUIRED BY STATE LAW.

THE MEMOS CAME TO LIGHT THROUGH A CIRCUITOUS ROUTE. THEY WERE OBTAINED BY THE SECURITIES AND EXCHANGE COMMISSION DURING REVIEW OF A CORPORATE TAKEOVER BY OCCIDENTAL. SENT TO STAFF MEMBERS OF THE

HOUSE COMMERCE SUBCOMMITTEE ON OVERSIGHT, THEY WERE THEN RELEASED TO THE PRESS. A CALIFORNIA OFFICIAL, DR. HARVEY F. COLLINS OF THE CALIFORNIA DEPARTMENT OF HEALTH, BROUGHT THE MEMOS BACK TO CALIFORNIA AFTER TESTIFYING AT A WASHINGTON, D.C. HEARING OF THE SUBCOMMITTEE.

I MENTION THIS BECAUSE WHILE THE SYSTEM DID NOT WORK TO CRACK THIS CASE, A LOT OF GOOD PEOPLE MADE SURE THAT THE INFORMATION WAS NOT BURIED IN SOME OBSCURE GOVERNMENTAL FILE. THEY DESERVE OUR THANKS AND underscore the need for interagency cooperation.

THE CASE ILLUSTRATES HOW EASILY FRAUDULENT ACTIVITY AND FALSIFIED INFORMATION CAN DEFEAT THE SELF-MONITORING SYSTEM THAT IS THE BACKBONE OF MANY POLLUTION CONTROL EFFORTS. WE NEED MORE INSPECTORS AT THE REGIONAL BOARD LEVEL TO PREVENT THIS TYPE OF CASE FROM REOCCURRING. WE ALSO NEED CRIMINAL PENALTIES FOR FLAGRANT MISUSE OF HAZARDOUS MATERIALS AS A NECESSARY DETERRENT TO CORPORATE IRRESPONSIBILITY. THEY WOULD BE A MEASURE OF THE SERIOUSNESS WITH WHICH WE VIEW THIS PROBLEM. THEY WOULD HERALD A MAJOR CHANGE IN ATTITUDE TOWARDS THOSE WHO DELIBERATELY POLLUTE OUR WORLD.

I THANK YOU FOR THE OPPORTUNITY TO APPEAR BEFORE YOU TODAY. THE TASK YOU HAVE SET YOURSELF IS A WORTHY ONE. HAZARDOUS WASTES ARE TREATED IN THE LAW WITH LITTLE MORE CONCERN THAN OTHER TYPES OF DISCHARGE, BUT THEY ARE UNIQUE IN THE DANGERS THEY POSE AND IN THE LOW CONCENTRATIONS THAT BREED LONG-TERM EFFECTS. WE ARE REAPING THE HARVEST SOWN BY OUR LACK OF KNOWLEDGE AND POOR CONTROL LAWS IN THE INCREASING NUMBER OF SERIOUS PROBLEMS THAT ARE BEING UNCOVERED DAILY ACROSS THE COUNTRY.

IT WILL BE EXPENSIVE TO FIX THOSE PROBLEMS. THAT SHOULD BE A LESSON TO US: WE MUST CONTROL HAZARDOUS MATERIALS AT THE SOURCE BY HOLDING THOSE WHO USE THEM STRICTLY ACCOUNTABLE FOR THEIR ACTIONS. LOOPHOLES THAT ALLOW ABANDONMENT OF PROBLEMS MUST BE CLOSED. NO LONGER SHOULD IT BE "COST EFFECTIVE" FOR A MINE OWNER OR HAZARDOUS DUMP SITE OPERATOR TO TURN HIS BACK ON THE PROBLEM. IF THAT IS DONE, I THINK YOU WILL HAVE SET THE CONTEXT FOR CORPORATE RESPONSIBILITY THAT WILL LEAD TO SIGNIFICANT IMPROVEMENTS IN HOW WE DEAL WITH HAZARDOUS WASTES.

STATE OF CALIFORNIA, DEPARTMENT OF
STATE WATER RESOURCES CONTROL BOARD
PO BOX 120, SACRAMENTO, CALIFORNIA 95801
(916) 322-0138

EDMUND G. BROWN JR. Governor



In Reply Refer
to: CMW: 221

Honorable John H. Chafee
United States Senator
3105 Senate Office Building
Washington, D.C. 20515

Dear Senator Chafee:

HAZARDOUS WASTE HEARINGS

At the June 29 hearing of the Subcommittees on Environmental Pollution and Resource Protection in San Francisco, I asked for permission to supplement my remarks. The attached material explains the authority of the State Water Resources Control Board and the California Regional Water Quality Control Boards over pollution from hazardous substances.

Regarding federal legislative proposals in this area, I want to emphasize the importance of recovery for losses to natural resources. The administration's proposal would limit recovery to restoration or replacement costs. That approach ignores irreplaceable resources. A gray whale or a unique plant community may hold far more value than a fish raised in a hatchery. The administration proposal would say that because they are irreplaceable, there is no recovery. We are told that because something is priceless, it is worthless.

The State Water Resources Control board supports your proposal to provide procedures for assessing losses to natural resources. Setting liability for these losses is needed to provide an adequate deterrent to polluters. The compensation we receive can be used to protect our remaining resources.

Thank you again for giving us the opportunity of presenting our views on this vital subject. If you need any additional material, feel free to contact us.

Sincerely,

Carla M. Bard
Member

Attachment

CMWILSON/estoons
7-9-79

CALIFORNIA WATER QUALITY LAWS
AS THEY RELATE TO THE REGULATION OF HAZARDOUS WASTE*

by

Carla Bard, Member
California State Water Resources Control BoardGeneral Water Quality Laws

The State Water Resources Control Board is a five-member board charged with the responsibility of administering the State's water rights and water quality laws. We share the water quality responsibilities with nine Regional Boards located in the major watershed areas of the State. The State and Regional Boards have broad powers and responsibilities with respect to water quality control. These powers can be conveniently divided into two areas:

- (1) planning and
- (2) regulation

With respect to planning, water quality control plans have been adopted in each region. The plans list the existing and anticipated beneficial uses made of the surface and groundwaters within the region, the quality of the water necessary to protect those beneficial uses and a plan of implementation.

Individual actions relating to water quality must implement and be consistent with applicable water quality control plans. By law, each individual waste discharger to the waters of a region must report

*Supplement to testimony presented to the Subcommittees on Resources Protection and Environmental Pollution of the Committee on Environmental and Public Works, U. S. Senate, June 29, 1979, in San Francisco, California.

proposed discharges to the State and obtain either waste discharge requirements under State laws or an NPDES permit under federal and state laws. In this connection, it should be noted that while the NPDES permit program is limited to surface waters, the State's waste discharge requirement authority extends to groundwater. These permits place limits on the amount of pollutants which can be discharged to a stream or to the groundwater. Additionally, water quality control plans and permits can specify certain areas where the discharge of waste or certain types of waste will not be permitted.

In the event that waste dischargers do not report their discharges or fail to comply with the relevant water quality control plan or the terms of their discharge permit, the State can pursue a variety of enforcement actions ranging from administrative cease and desist orders to court actions seeking injunction and/or civil monetary remedies.

In this connection, it should be noted that monitoring for compliance with requirements is basically the responsibility of the discharger which is satisfied through reports to the Regional Boards. Such self-monitoring is supplemented by spot inspections by Regional Board staff.

Specific Authorities Over Hazardous Wastes

In addition to the State's general water quality laws, the State and Regional Boards have specific statutory responsibilities with respect to hazardous waste disposal.

Regional Boards must approve sites suitable for the disposal of different kinds of liquid wastes, consistent with classifications adopted by the State. A classification scheme has been developed which categorizes dump sites according to the types of materials received. We are additionally empowered to regulate the disposal of liquid waste at such approved sites as necessary for the protection of the quality of the waters of the State. For example, Class I disposal sites receive the most deleterious substances and are required to be located in areas where deposits will not affect water quality.

The authorities of the State and Regional Boards with regard to the siting of hazardous waste sites and the regulation of discharges from sites, coupled with the powers of the State Department of Health Services, appear to provide adequate regulatory oversight of sites through the time period at which their useful life ends. But what about after this period? What assurances are there that hazardous waste sites will be properly closed and maintained once they have served their useful lives? To address these concerns, the State Water Resources Control Board sponsored legislation last year to deal with the problem of assuring proper closure of hazardous waste sites once they have served their useful lives.

The impetus for this legislation was the water quality problem associated with the Stringfellow Class I Disposal Site in Southern California. This problem was mentioned in the testimony of June 29th. The site operated from 1954-1972 and during that period almost 32 million gallons of industrial wastes were received.

The major problem with this site involves a series of acid ponds on the site that were constructed to evaporate the waste. As the site filled up, it became apparent that major storms had the potential of causing these acid ponds to overflow. Stormwater runoff could then carry wastes out of the site. In response the appropriate Regional Board requested the owner and operator to take remedial steps to correct stormwater diversion systems deficiencies. The owner's response was basically to cease operations and to walk away from the site.

It was thereafter found that existing laws were inadequate to assure proper closure of the site. Liens on the property were ineffective because of the value of the land. The corporation owning the site had no assets. The County in which the site was located declined to take action to abate the threat of pollution at the site because of the costs and the threat of subjecting itself to possible liability. The ultimate result was the passage of state legislation to finance closure of the site and passage of legislation to prevent future occurrences of this type.

This legislation was enacted and signed into law late last year.

The legislation has several key aspects:

1. It requires the Regional Water Quality Control Boards to identify liquid and hazardous waste sites that would pose an adverse threat to the environment if improperly closed.
2. Once sites have been identified, the owners and operators are required to submit reports to the state regarding their closure plans. Specifically the method of closure must be detailed together with measures to finance the plan.
3. These reports are then to be reviewed by the state for sufficiency. If, for example, the ability of the owner or operator to finance the closure of the site is not established, such owner or operator can be required to establish a monetary reserve fund or post a bond to assure proper closure.
4. While it is hoped that the above measures will lead to adequate closure, the legislation also established, as a backup, a Site Closure and Maintenance Fund. Fees from owners and operators of liquid and hazardous waste sites will be deposited into the Fund. It is envisioned that the Fund will serve three purposes:
 - a. It can assist in site closure efforts where funds set aside by the owner or operator prove to be inadequate.

- b. It could be used to fund the closure of the sites abandoned before the effective date of the legislation.
- c. It could be used to fund closure efforts for sites that are not identified as posing an environmental threat during the review process.

It must be pointed out, however, that the size of the Fund cannot exceed \$500,000 and that such a limit may hamper its ultimate utility.

But, in any event, we are proud of this legislation. We feel it can go a long way toward preventing future problems such as Love Canal and can be looked at as a model for other jurisdictions to consider and even build on.

Statement of Harvey F. Collins, Ph.D., P.E.

I am Harvey F. Collins, Acting Chief, Hazardous Materials Management Section, California State Department of Health Services. For my opening statement this afternoon, I would like to present an overview of California's approach to the management of hazardous wastes, discuss briefly the State's Hazardous Waste Management Program administered by the DHS, describe several incidents that involved releases of hazardous materials in the State, and comment on the Federal proposal for managing such releases.

OVERVIEW OF CALIFORNIA'S APPROACH

In California three state agencies have primary jurisdiction over the management of hazardous wastes. These agencies are: the California Department of Health Services (DHS), the State Water Resources Control Board (SWRCB) and 9 Regional Boards and the California Highway Patrol (CHP). Under provisions of State law the DHS has the authority and responsibility for the regulation of hazardous waste management in California to safeguard public health, livestock, wildlife and the environment and, in accordance with the Federal Resource Conservation and Recovery Act of 1976 (RCRA), has been designated as the State agency responsible for hazardous waste planning and management. The SWRCB regulates the establishment and closure of disposal sites that receive hazardous wastes to ensure that the surface water and groundwater quality of the state is not degraded. The CHP regulates the transportation of hazardous materials. Additionally, the Air Resources Board (ARB) is responsible for preventing the discharge of hazardous materials into the atmosphere and the Office of Emergency Services (OES) maintains an alert center and coordinates the responses to spills of hazardous materials. Thus, California's overall approach to the management of hazardous materials is multifaceted and makes full and effective

use of the particular capabilities, experience and specialized knowledge of the several agencies to provide effective control of hazardous wastes. This approach does require close working relationships among the agencies which has been developed informally and through Memoranda of Understanding.

CALIFORNIA'S HAZARDOUS WASTE MANAGEMENT PROGRAM

California's Hazardous Waste Management Program, administered by the DHS, was created in 1972 when the Legislature concluded that the management of hazardous wastes could pose a serious threat to public health and the environment. On December 13 of that year, Assembly Bill 598, the Hazardous Waste Control Act (HWCA), was signed into law and became effective July 1, 1973. This law required the DHS to adopt and enforce regulations governing the handling, processing, and disposal of hazardous wastes to safeguard humans, domestic livestock, and wildlife. During the last six years the law has been extensively amended to strengthen the broad, general enforcement authority conferred on the DHS in the original version.

The State's Hazardous Waste Management Program, created pursuant to the HWCA as amended, presently consists of the following major elements:

- Definitions and criteria for the identification of hazardous and extremely hazardous wastes, and lists naming chemicals that meet those definitions and criteria;
- A manifest system for the identification and tracking of each load of hazardous wastes transported in the State;
- A registration program for the identification of haulers and their vehicles that transport hazardous wastes;
- A permit program for regulating the design and operation of all facilities, on or off-site, that handle, store, treat, or dispose of hazardous wastes;

- An additional permit program for ensuring that each separate load of extremely hazardous wastes receives special handling and care;
- Field surveillance and enforcement teams equipped with special vehicles, safety gear, and waste testing apparatus to ensure that hazardous wastes are managed in accordance with the law;
- Enforcement procedures and powers backed by civil and criminal penalties of up to \$25,000 per day of violation and one year's imprisonment for punishing willful or negligent violators of the law;
- Procedures for the management of incompatible wastes, standarized methods for the sampling and analysis of hazardous and extremely hazardous wastes, and a fully equipped analytical laboratory;
- A program for stimulating the recovery of resources from hazardous wastes; and
- A schedule of fees levied on disposal of hazardous waste for supporting the Hazardous Waste Management Program.

To assist the DHS in developing and implementing its Hazardous Waste Management Program, the California Legislature established a 7-member Technical Advisory Committee, representing a cross-section of public and private interests. Meetings of the Committee are open to receive information from the public.

Although California's Hazardous Waste Management Program has existed for 6 years, a number of problems remain to be solved. These problems are simllar to those that are of national concern regarding hazardous waste management:

- Establishment of new hazardous waste facilities;
- Management of uncontrolled hazardous waste sites;
- Prevention of illegal disposal of hazardous wastes;
- Management of small quantities of hazardous wastes dispersed among many sources;
- Dependence on disposal of hazardous wastes by land burial;
- Lack of capital funding for demonstration of new technology, installation of needed facilities or correction of environmental and public health problems associated with hazardous wastes; and

- Lack of a comprehensive monitoring program to determine the effects of hazardous wastes on human health and the environment.

RELEASES OF HAZARDOUS MATERIALS IN CALIFORNIA

A number of incidents involving releases of hazardous wastes into the environment have come to the attention of the DHS. Some of these incidents, deliberate and accidental, have been briefly described in Attachment 1.

Two incidents, excluded from Attachment 1, have received national attention: the leakage of hazardous wastes from the Stringfellow Quarry Corporation's disposal site into surface waters near Riverside, California; and the contamination by DBCP of drinking water wells in the vicinity of Occidental Chemical Company's uncontrolled hazardous waste site in Lathrop, California. Because these 2 incidents involved contamination of surface and ground waters, respectively, the Regional Water Quality Control Boards having jurisdiction in those cities and the SWRCB had primary authority and responsibility for dealing with them.

At the request of the Riverside County Health Department, the DHS recently conducted an investigation of the Stringfellow site to identify and quantify the chemical constituents of wastes deposited at the disposal site and to determine the extent of their migration off site. The investigation was limited to studying the disposal site itself, the surrounding canyon, and the drainage course below the site, as well as the surface waters and soils, subsurface soils to a depth of 1 meter, and vegetation. This survey cost the DHS approximately \$60,000 and consumed more than one person-year of effort.

The DHS has cooperated with the appropriate Regional Water Quality Control Board and with SWRCB in conducting its investigation of the Stringfellow site and also in its investigation of Occidental Chemical Company's uncontrolled hazardous waste site. The DHS' role in the latter case has been primarily to provide technical support for the Regional Board. As you know, following my testimony before the Subcommittee on Oversight and Investigations of the House Committee on Interstate and Foreign Commerce, the Subcommittee gave me copies of the company's internal memoranda concerning the improper disposal of hazardous wastes at the company's Lathrop facility. These have been given to the Regional Board to assist them in their legal actions against the Company and it is our understanding that the district attorneys of the counties involved are investigating the matter.

Health protection is the basic purpose of our program and the clear objective of RCRA. To accomplish this, the program must be able to predict, determine, and evaluate the extent of the health effects associated with these major problems. Generally, the capability of hazardous waste management programs extends to a determination of the extent and degree of environmental harm (e.g., levels of contaminants) through sampling and analysis, but does not include the capability of determining the past or potential effects of such harm on the population at risk. Health effects determination would require the establishment of supporting medical, toxicological, and epidemiological expertise for the program. A similar level of statistical and electronic data processing expertise would be required to use effectively available health intelligence systems (e.g., doctors first reports, tumor registry information, birth defect records, hospital records, Medicare reports) and to relate trends or anomalies in health characteristics to exposure to hazardous wastes.

Health effects determination capability is not specifically identified as a necessary or desirable component under RCRA, although RCRA does recognize that hazardous wastes present special dangers to health. Nevertheless, the development of this capability is one of the top priority needs of California's Hazardous Waste Management Program.

COMMENTS ON THE FEDERAL PROPOSAL FOR MANAGING RELEASES OF HAZARDOUS MATERIALS

The Carter administration's proposal for creating a \$1.6 billion superfund for the emergency cleanup and containment of oil and hazardous substances spills and uncontrolled hazardous waste sites (the Oil, Hazardous Substances, and Hazardous Waste Response, Liability and Compensation Act of 1979) addresses an important and unmet need with regard to the containment and correction of hazards associated with abandoned chemical dumps. In California we believe that we can effectively search out abandoned sites and, with some federal funding assistance, we can identify the materials which have been deposited and the types of problems which are posed. We have prepared a plan to accomplish this and intend to undertake a statewide investigation shortly. The physical work of cleanup and/or containment will require substantial funds. We are concerned that monies from this source may not be available for several years and interim funds such as those requested by EPA in a 1980 budget amendment are necessary to meet any immediate emergencies.

Although I have not had an opportunity to consider all the ramifications of the administration superfund proposal, several items would require careful State scrutiny. These are:

- Preempting state authority over the establishment of funds, liability or financial responsibility requirements with respect to spills of hazardous materials where that authority duplicates the purposes of the proposed legislation;
- Requiring states to agree by contract to pay for the maintenance of federally contained hazardous waste sites for up to 19 years; and
- Requiring states to ensure the provision of off-site disposal capacity if off-site disposal is required for containment.

Thank you for inviting me to participate in this hearing.

RELEASES OF WASTE CHEMICALS IN CALIFORNIA

Deaths from Hydrogen Sulfide in Tannery Sludge

Four deaths occurred between 1963-1976 in California tanneries as a result of handling of waste tanning sludges. Workers employed by a contract waste hauler were overcome by hydrogen sulfide gas while collecting the sludges from collection sumps.

Poisonings from Tetraethyl Lead Sludges

In 1968, attempts to process tetraethyl lead waste for recovery in the San Francisco Bay Area resulted in alkyl lead poisoning of site employees, and exposure of employees at other firms in the surrounding area. Toll collectors on a bridge on the route to the plant became ill due to escaping vapors from a truck containing the material.

Formation of Water Soluble Toxic Substances from Ruptured Drums

Several drums of phosphorus oxychloride, phosphorus thiochloride and thionyl chloride were improperly dropped off at a dump in Riverside County in 1973. Later, during a flood, the drums were unearthed, ruptured and washed down a stream. They released hydrogen chloride and sulfur dioxide gas, and contaminated water in the stream.

Hydrogen Chloride Generation at Landfill

A waste hauler emptied several gallons of methyltrichlorosilane into rubbish at a chemical waste landfill near San Diego in 1973. The material reacted with moisture in the landfill, releasing hydrogen chloride gas. A bulldozer operator was overcome by the gas during covering operations and was sent to a hospital for recovery.

Child Burned by Sulfuric Acid Waste

In February 1975, a small boy was burned when he dipped his hand into a stream of green liquid that was flowing down a gutter in Martinez, California. The liquid was concentrated sulfuric acid waste spilling out of equipment in a nearby abandoned metal finishing plant.

Injuries from Pesticide Fire

On April 10, 1975 a truck carrying 24,000 lbs. of Lannate-L, a highly toxic carbamate insecticide, overturned and caught fire on a downtown Los Angeles freeway. The police and firemen who arrived at the scene were not immediately informed about the contents of the truck. Not until after they had inhaled toxic fumes did the men start using self-contained breathing apparatus. Thirty-eight persons at the scene suffered symptoms of exposure to Lannate-L; 31 were hospitalized and 7 were treated and immediately released.

Formation of Toxic Vapors During Pond Disposal

In 1975, a waste hauler deposited 5,000 gallons of liquid waste containing volatile chlorinated organic compounds into an evaporation pond at a chemical waste disposal site in the San Francisco Bay Area. A large cloud of extremely odorous material was released. Hundreds of complaints were filed by residents in the city of Richmond. Several persons claimed illness from the odors. A visible plume produced by the incident was reported over ten miles down the San Francisco Bay from the disposal site. The Department of Health Services, in conjunction with other State agencies, has prohibited the ponding of such compounds.

Spill of Chlorinated Hydrocarbon Pesticide

A truck hauling a tank containing an estimated 1,200 gallons of the pesticide Telone II, a chlorinated hydrocarbon, was involved in an accident in Sutter County, California, on October 21, 1975. A large portion of the volatile liquid spilled onto the highway, and an estimated 80 persons (firemen, traffic officers, and bystanders) were exposed to the vapors. Forty-six persons were examined at a local hospital, and 24 were hospitalized overnight.

Illegal Dumping of Bilge Waters

In March 1976, California Department of Health Services inspectors apprehended a San Francisco-based liquid waste hauler discharging 5,000 gallons of waste onto a vacant lot in Concord, California. The waste was observed running under a fence onto State highway property and down a drainage ditch which ran into a nearby creek. Analysis of the waste showed it contained dissolved heavy metals and oil. Inspection of the lot indicated that large volumes of oils and sludges had been previously dumped at the site. Oil and chemical stains were visually detectable along the ditch to the point where the wastes had entered the creek. Investigation of customers of the hauler indicated that more than 90,000 gallons of wastes from various customers was unaccounted for. The firm's liquid waste hauler license was suspended, and the president was found guilty and fined by the San Francisco District Attorney.

Violent Reaction, Pressure Generation in Tank Trucks

In 1976, a hazardous waste hauler in Richmond mixed, in his 30-barrel tank truck, a liquid waste containing butyl acetate in xylene, with an etching waste containing sulfuric acid, nitric acid and hydrofluoric acid. A hydrolysis reaction took place. Pressure was generated in the tank, and the safety relief valve was blown off while the truck was travelling through a residential area. A private residence was sprayed with the hazardous mixture. No one was injured, but considerable clean-up and repainting of the house was required.

On April 9, 1977 freeway traffic in Montebello, California, was disrupted for nearly 2 hours after a tanker truck carrying oil-based sulfuric acid exploded, spraying the waste across 4 lanes of roadway. The driver had picked up 200 gallons of 5 percent sulfuric acid from a plating firm, and the acid had apparently reacted with residue from other waste chemicals already present in the tank. The explosion blew a large chunk of the truck tank into the rear of a passing car; the driver was not injured. The truck driver was injured slightly when some of the waste sprayed into his eyes. Damage was limited to the truck tank and the car.

The California Department of Health Services has developed comprehensive guidelines that indicate what wastes should not be mixed. These guidelines will be submitted to EPA for use nationwide.

Hydrogen Sulfide Generation at Landfill

In October 1976, several workers at a municipal solid waste disposal site in Santa Cruz County were overcome while spreading dehauling sludges from a tannery. A bulldozer operator lost consciousness on the moving machine while spreading the sludge, but regained consciousness when the machine moved out of the area. The Department of Health Services found that hydrogen sulfide was released when the sludge was disturbed.

Nitrogen Dioxide Generation at Disposal Site

Drums of mixed concentrated nitric and hydrofluoric acid waste accepted at a disposal site in Richmond in 1977 ruptured when rolled into a burial pit, releasing clouds of nitrogen dioxide into the air. The operator of the site no longer accepts that waste; it is now accepted at another facility where it is neutralized and ponded.

Eruption of Buried Waste

In January 1978, a buried drum of silicon tetrachloride erupted at a northern California Class I disposal site, discharging large quantities of hydrochloric acid into the air. A neighboring farmer had to evacuate his home.

Apparently water from heavy rains had seeped into the drum and had reacted with the silicon tetrachloride. The Department of Health Services has banned the burial of water-reactive wastes such as silicon tetrachloride, without special permits from the Department.

Toxic Vapors from Leakage of Soil Fumigant

On April 18, 1978 a tank truck carrying D-D soil fumigant began to leak as it traveled through Davis, California. The truck left a wet strip of fumigant on the asphalt pavement along its route until police stopped the truck. The fumigant, a chlorinated hydrocarbon, is quite volatile, is insoluble in water, and is not readily detoxified by simple chemical means. Sand was spread on the spilled fumigant to reduce wind dispersion of toxic vapors. Approximately 2-3 yds. of D-D permeated paving were removed. The wastes were then collected and transported to an appropriate disposal site.

Nearly 300 people living along the 4-mile route that the truck had taken were evacuated from their homes. At least 16 people were hospitalized for observation after being overcome by vapors from the fumigant.

TESTIMONY TO BE PRESENTED BY DR. ALVIN GORDON, MEMBER, AIR
RESOURCES BOARD BEFORE THE UNITED STATES SENATE SUBCOMMITTEES
ON ENVIRONMENTAL POLLUTION AND RESOURCE PROTECTION
SAN FRANCISCO, CALIFORNIA,
FRIDAY, JUNE 29, 1979.

Mr. Chairman, and members of the Subcommittee, good afternoon. For the record, my name is Alvin Gordon, Member of the California Air Resources Board, the State's air pollution control agency. I appreciate the opportunity to appear here before you this afternoon along with representatives of our sister agencies to provide you with my agency's views on the relationships between the air environment and hazardous waste disposal, and the larger and perhaps more important question of toxic substances in the air environment.

With respect to hazardous waste disposal, our primary concern is the release of volatile organic vapors and finely divided dusts into the atmosphere as a result of improper operation of both class one disposal sites and the more common landfill disposal sites. One particularly well-documented example that illustrates our concerns occurred here in the Bay Area in the early 1970's. Following a number of complaints of unpleasant odors from a class one disposal facility, the Air Resources Board and State Health Department began a series of measurements in the vicinity of the site, across the Bay in Benicia. Our scientists found that ambient levels of lead in the atmosphere in the vicinity of this site were as high as 135 μ g of lead per cubic meter of air--a level approximately 100 times greater than the level allowed by the current EPA

air quality standard for lead exposure. We found, following further investigation, that a number of Bay Area oil refineries and petrochemical plants had been transporting wastes--including volatile lead compounds--to holding ponds on the site. The volatile, highly toxic lead compounds in the ponds evaporated into the air of the surrounding community. Of course, we stopped this practice immediately. But, how many thousands of people were exposed to dangerously high levels of highly toxic wastes during the period when lead and other volatile organic compounds were allowed to evaporate into the air? I'm afraid we'll never know, but it's worrisome, even now, nearly a decade later.

Even with ordinary municipal wastes now slowly decomposing in California's many closed landfill sites, there may be a newly developing hazard. Recently, efforts have begun to extract methane gas generated by the decomposition of buried organic material contained in the dumps. We've learned that other materials, such as chlorinated hydrocarbons and hydrochloric acid, are also present and are extracted with the methane gas. This creates not only a materials-handling problem for the recovery operators, but also it presents a potential health hazard for both the users of the resulting utility gas and for those living in the area surrounding the closed dump site. Apparently, chlorinated organics, either from solvents or from the decomposition of chlorinated polymers in the waste, are decomposing, causing a slow seepage of hydrochloric acid and chlorinated hydrocarbons into the air. California is beginning to encourage the recycling of such recoverable solvents and

plastics as an alternative to their disposal in landfill dumps. This will undoubtedly decrease future hazards but the Air Resources Board and other environmental agencies are still left with the problem of what to do about the hundreds of existing sites.

A third example illustrates the need for close coordination between agencies responsible for air pollution control and agencies responsible for the disposal of hazardous wastes. The Air Resources Board and local air pollution control districts require, for certain industries, emission control systems--condensers and adsorption columns--designed to prevent the escape of solvents into the atmosphere. Some of these solvents are toxic as well as photochemically reactive. Certain processes generate large amounts of waste solvent but currently only a small fraction of this waste is recycled. Ideally, all of it would either be recycled or incinerated to provide usable process heat. Alternatively, we require that these solvents be disposed of in secure dump sites by methods which prevent their release into the atmosphere. However, we're finding that a large portion is disposed of in landfills in a manner which allows a substantial amount of evaporation into the atmosphere. Thus, the effort and expense committed to controlling air emissions of these solvents at their point of origin is undermined by their subsequent release into the atmosphere because of an illogical disposal practice. We are currently working on a revision of our solvent control regulations that will require either recovery of the solvents or disposal in a manner that will not negate the gains made by the original emission control system.

Over the next year or two, the Air Resources Board will substantially expand its efforts in assessing the potential for air emissions from hazardous waste disposal. We will sponsor, for example, emissions testing of waste recovery facilities designed to convert waste into solid or liquid fuels; we will also need to look carefully at air emissions from the technically sophisticated hazardous waste disposal facilities now being developed by enterprising companies here in California and elsewhere. We want to be very sure that the solutions to one critical environmental problem do not lead to the creation of a new one.

For the future, we feel that innovative solutions to the hazardous waste disposal problem must be encouraged--ideally, process modifications that would either eliminate the production of such wastes entirely or accommodate on-site recycling of such wastes back into the process. On-site disposal of organic wastes, such as non-reclaimable solvents by controlled incineration would be, in my view, preferable to some of the other alternatives one might consider, since this approach would eliminate the hazard associated with highway transport of such materials to disposal sites.

Turning to the larger question of toxic substances in the air environment, I want to urge the Committee not to overlook a potential problem that may be even more serious than hazardous waste management. Volatile toxic substances are released--sometimes inadvertently, sometimes not--at all stages in the process: during manufacture, during transport via rail,

highway and water, and at the point of use. Total community exposures to toxics, in many cases, is quite probably far greater at these earlier stages of the cycle than at the disposal stage. The Air Resources Board, over the past couple of years, has made a strong commitment to identifying toxic materials that are produced and used in California; to measuring atmospheric concentrations of such materials; and to developing regulatory measures that will ensure that community exposure to toxic substances is reduced to an absolute minimum.

We now have underway, for example, a survey that will identify the ten most important chemical carcinogens now in use in California, locate the points at which these substances may be released into the atmosphere, and measure the amounts being emitted. When this survey is completed, I can assure you that my fellow Board members and I will move quickly to reduce air emissions of these substances.

Another example of our approach to dealing with toxics is in the area of standards-setting. Last year the Board adopted an ambient air quality standard for vinyl chloride--the first such standard in the nation for a chemical carcinogen. Within the next few weeks, regulations requiring vinyl chloride manufacturers and users to meet this tough standard will be on the books.

I am submitting for the record, Mr. Chairman, a much more extensive list of initiatives that the Air Resources Board has taken with the objective of minimizing community exposure to airborne toxic substances. I recommend that the Subcommittee and its staff review this material carefully--it represents a forward-looking program that contains elements not yet incorporated into the federal approach to the control of hazardous substances.

Looking to the future, I am convinced that the decade ahead will bring a new national commitment to limiting the release of hazardous substances into the environment. This will come about, in part, as a result of the increasing costs of petroleum-derived feedstocks used by most industries and increases in the cost of the energy required to convert those feedstocks. I predict that inadvertent releases of toxics to the atmosphere will decrease significantly on the basis of simple economic incentives.

However, I think much more must be done. Industry must accept, as a part of its responsibility to society, the obligation to operate and maintain all its facilities in such a way as to minimize exposure of its employees and the community in general to toxic substances. A great deal can be done at relatively small cost. This will require close cooperation between regulatory agencies such as ours and industry; it will require the development of innovative technology on the part of industry with financial support from government; and, perhaps

most importantly, it will require our instilling a sense of concern, of stewardship and community responsibility on the part of each producer and each user of toxic materials at all stages of the process.

I am optimistic that the Congress, working together with the Executive Branch, the states, and industry can--given a strong commitment to protecting public health and the leadership shown by this Subcommittee--that we can work together in the years ahead to solve the serious problem that we have discussed here today.

Thank you very much for your attention. I would be pleased to try to answer any questions that you or other members of the Subcommittee may have, Mr. Chairman.

Testimony of Dr. Alvin Gordon

Attachment 1

Air Resources Board Programs for Monitoring and Control
of Toxic and/or Hazardous Substances
in California's Air Environment

In November, 1977 an Ad Hoc Panel on Atmospheric Carcinogens was appointed at the request of the Chairman and the Executive Officer of the ARB. The Panel was composed of experts in the fields of medicine, epidemiology, atmospheric chemistry, and environmental engineering drawn from California universities and the Department of Health Services. The Panel was formed to further the Board's understanding of the nature of the problem of atmospheric carcinogens in California and to provide suggestions for actions, wherever deemed necessary, to minimize the severity of the problem. The Panel's final report was delivered to the Board on April 25, 1979 and included a list of seven recommendations for Board action. The Board has responded to these recommendations in a variety of ways including: research projects (both extramural and in our own laboratories), standards-setting, air monitoring activities, the development of emission regulations, various enforcement and investigatory actions, and cooperation with other agencies in epidemiological studies.

It is our view that activities of the sort suggested in the Ad Hoc Panel's list of recommendations are equally appropriate for dealing with problems related to the control of the broader class characterized as toxic substances in California's air environment. Using the categories proposed by the Panel, we have summarized below the activities the Board has taken in the

present fiscal year (78-79) and will undertake in the next fiscal year (79-80) to minimize community exposure to airborne toxic and/or hazardous substances.

RECOMMENDATION ONE:

A CONTINUING AND CURRENT INVENTORY SHOULD BE MADE OF EMISSIONS OF POTENTIAL ATMOSPHERIC TOXIC AND/OR HAZARDOUS SUBSTANCES IN CALIFORNIA. AT A MINIMUM, THIS INVENTORY SHOULD INCLUDE CHEMICALS OR INDUSTRIAL PROCESSES ASSOCIATED WITH CANCER OR OTHER ACUTE OR CHRONIC HEALTH EFFECTS IN HUMANS THAT ARE OR HAVE THE POTENTIAL FOR BEING EMITTED INTO CALIFORNIA'S AIR.

Investigations and Enforcement Activities:

1. In response to a complaint from the Coastal and Harbor Hazards Council in Long Beach, Enforcement staff has investigated the GATX facility to determine emissions of methyl chloroform (1, 1, 1-trichloroethane), a suspected mutagen.
2. Enforcement staff has investigated complaints of chemical odors from Cordova Chemicals in Rancho Cordova.
3. The staff has investigated complaint referred by the EPA regarding hazardous fiberglass dust and resin emissions from a marine products manufacturer.
4. The staff has investigated several complaints related to fluoride and hydrofluoric acid emissions.

5. The staff continues to monitor gasoline for sale in California for its lead and manganese content. Violations are documented for action by The State Attorney General and/or the EPA.
6. The staff has investigated several complaints of aluminum dust emissions.
7. The staff has investigated complaints of styrene emissions from Alfa Chemical, AMOCO Reinforced Plastics, and Thiokol Dynachem in Riverside as well as Hess Company in Woodland.
8. Consulted with the Department of Health Services on methods to be used in moving hazardous wastes from an old Occidental Chemical Company disposal site in the Bay Area to a Class 1 site.

Research Contracts:

	<u>Title</u>	<u>FY</u>	<u>Amount (\$1,000)</u>
1.	"Fine Particle Emissions in the South Air Basin". This project will identify heavy metals and other hazardous substances being emitted in the Los Angeles area.	78-79	325
2.	"Emission Characteristics of Primary Petroleum Production Operations in California". This project will characterize toxic and other hydrocarbon emissions from oil field operations throughout California.	79-80	250

3.	"Geographical and Temporal Distribution of Atmospheric Mutagens". This study will assess the mutagenicity of suspended particulate matter in the atmosphere and determine the chemical identity of those materials found to be mutagenic.	78-79	135
4.	"The Impact of Owens Lake on Air Quality in the Owens Valley". The investigator will determine whether wind blown dust from the area around Owens Lake contains high concentrations of toxic metals.	78-79	22
5.	"An Inventory of Carcinogenic Substances Released into the Ambient Air of California". This project will identify the ten carcinogenic substances of greatest concern in California's air environment and locate their sources.	78-79	100
6.	"Survey of Airborne Nitrosamines in Los Angeles". The investigator has measured ambient concentrations of nitrosamines, which are potent carcinogens, in Los Angeles, the Bay Area and in Hollister near a rocket-fuel production plant.	78-79	63

7. "In Vivo Fate of Nitrogenous Air Pollutant 78-79 150
Derivatives". The investigator will identify the organs most likely to be affected by exposure to nitrites and nitrates formed in photochemical smog.

RECOMMENDATION TWO:

PERIODIC ASSESSMENTS OF ATMOSPHERIC TOXIC AND/OR HAZARDOUS SUBSTANCES SHOULD BE MADE AND REGULATIONS ESTABLISHED FOR THOSE FOUND TO BE OF MAJOR CONCERN. AN INITIAL ASSESSMENT SHOULD INCLUDE KNOWN CARCINOGENS SUCH AS VINYL CHLORIDE, ASBESTOS, BENZENE, SOOT, TARS AND OILS, AS WELL AS SUBSTANCES LISTED IN EPA'S NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (ASBESTOS, BERYLLIUM, MERCURY, AND VINYL CHLORIDE).

Regulatory and Enforcement Activities:

1. The adequacy and enforceability of local air pollution control districts' (APCDs) regulation of the thousands of asbestos sources in California is now being examined.
2. Regulations relating to benzene emissions from petroleum refining process operations are being reviewed for adequacy and enforceability.
3. APCD regulations for control of beryllium particulate emissions from the ten emitting facilities in California are being reviewed for adequacy and enforceability.

4. Substantial enforcement effort has been devoted to the control of coal tar pitch volatile emissions from the coke ovens at the Kaiser Steel Corporation's mill in Fontana.
5. The adequacy and enforceability of APCD regulations regarding the control of mercury emissions from ten sources in California are being examined.
6. Ambient air quality in the vicinity of the three major emission sources of vinyl chloride in California is being monitored on a regular basis to determine compliance with the California ambient air quality standard and federal standards.
7. Ambient air sampling in the area surrounding the AMVAC Chemical Company in the City of Commerce was instituted to determine community exposure to DBCP, a known human male sterulant and suspected carcinogen, being emitted due to faulty workplace emission control equipment (Cal-OSHA required).

Standards-Setting Activities:

1. On June 14, 1978 an ambient air quality standard for vinyl chloride was filed with the Secretary of State by the Executive Officer of the Air Resources Board. This standard was set partially on the basis of ARB monitoring in the Saugus area which indicated that high concentrations of the human carcinogen, vinyl chloride, were present in the community surrounding a manufacturing facility in the area. This is

the first ambient air quality standard for a carcinogen set by a public regulatory agency in the United States. On the basis of this action by the Board, the staff is now working with the local Air Quality Management District to develop enforceable emission control regulations to achieve the air quality standard for vinyl chloride in their area.

2. During the coming budget year, control measures for the toxic and/or hazardous substances: asbestos, benzene, and polycyclic organic matter (soot, tars, and oils) will be studied to determine the best available control technology. Once this has been accomplished, regulations will be drafted to require such controls from sources found to be significant from ARB surveys and site inspections.
3. In the next budget year, the results of the research project on atmospheric carcinogens in California will be available. Work will then begin on setting ambient air quality standards for those substances found to be significant hazards to the public. Substances to be considered for standards-setting will be evaluated as to the severity of health effects, dose received by the exposed population, and the size of the exposed population. Preliminary studies suggest that asbestos and benzene are likely candidates for new ambient air quality standards.

RECOMMENDATION THREE:

THE ARB SHOULD ESTABLISH PROCEDURES FOR THE ASSESSMENT OF POTENTIAL ATMOSPHERIC TOXIC AND/OR HAZARDOUS SUBSTANCES RESULTING FROM THE

INTRODUCTION OF NEW OR EXPANDING TECHNOLOGIES IN CALIFORNIA AND SHOULD
CONSIDER APPROPRIATE REGULATIONS AS WARRANTED.

Research Contracts:

	<u>Title</u>	<u>FY</u>	<u>Amount (\$1,000)</u>
1.	"Secondary Pollutants from Ammonia Injection". The investigator will de- termine whether the ammonia-injection method of controlling nitrogen-oxide emissions may lead to the emission of significant amounts of nitrosamines or other nitrogen-containing compounds.	78-79 79-80	150 100
2.	"Air Pollutant Emission Levels from Agricultural and Solid Waste Resource Recovery Units". Studies to check for toxic emissions from proposed waste- recovery facilities will be carried out.	78-79	125
3.	"Determination of Air Pollutant Emission Factors for Thermal Tertiary Oil Recovery Operations in California". The investigator has	78-79	100

measured emissions of arsenic and other hazardous substances that may be released as a result of enhanced oil recovery efforts.

4.	"Emission Characteristics of Cooling Towers Using Reclaimed Waste-Water in California". This project will assess public health risks associated with using reclaimed sewage system or agricultural runoff water in industrial cooling towers.	78-79	108
5.	"Toxicological Investigations of Fine Particulate Emissions from Oil-Fired Power Plants". These studies will examine the mutagenicity and other toxic properties of emissions from both oil- and coal-fired boilers of the type proposed for use in California.	78-79	133
6.	"Toxicological Investigation of Fine Particulate Emissions from Coal-Fired Power Plants".	79-80	175

RECOMMENDATION FOUR:

PESTICIDES AND THE SUBSTANCES EMPLOYED IN THEIR APPLICATION SHOULD RECEIVE SPECIAL, INTEGRATED ATTENTION DUE TO THEIR IMPORTANCE IN CALIFORNIA IN AGRICULTURAL, INDUSTRIAL AND DOMESTIC USAGES AND IN VIEW OF THEIR POTENTIAL HEALTH HAZARDS.

Investigations and Enforcement Activities:

1. The emission of arsenic, a known carcinogen, from cotton-gin waste burning (allowed by the Legislature in 1975) is being evaluated. The arsenic is sometimes present in defoliants sprayed on the cotton plants immediately before harvest.
2. The staff continues to investigate frequent complaints of drift from aerial application of pesticides into populated areas.
3. The staff assisted the Tehama County APCD in setting up monitoring facilities for Toxaphene emissions from a contaminated dirt pile near Vina. The dirt was removed and is awaiting safe disposal following contamination of a pasture during a cattle-spraying operation.
4. The Board has a continuing interest in emissions, including mutagenic products of incomplete combustion, volatilized pesticides, such as 2, 4, 5-T, and their contaminants and decomposition products, such as dioxin, that result from unnecessary burning of agricultural wastes.

Research Contracts:

	<u>Title</u>	<u>FY</u>	<u>Amount (\$1,000)</u>
1.	"Chemical Consequences of Air Quality Standards and of Control Implementation Programs". The investigator is characterizing the chemical transformations undergone by pesticides in photochemical smog to determine whether toxic substances are formed.	78-79	190
2.	"Potential Health Hazards Associated with Particulate Matter Released from Rice Straw Burning". This project will assess the mutagenicity and potential carcinogenicity of smoke and particulate matter produced when rice straw is burned under realistic field conditions.	78-79	64
3.	"A Study to Determine Air Pollution Emissions Associated with Pesticide Application in Fresno County". The investigator has determined use-patterns and emission rates for pesticides, including a number of toxic substances, in California's most important agricultural county.	78-79	50

RECOMMENDATION FIVE:

APPROPRIATE LABORATORY FACILITIES SHOULD BE AVAILABLE OR CREATED FOR CHEMICAL AND BIOLOGICAL DETERMINATIONS OF ATMOSPHERIC TOXIC AND/OR HAZARDOUS SUBSTANCES INCLUDING RESEARCH ON THESE TOPICS.

Research Contracts:

These facilities are partially funded and maintained through various ARB sponsored research. In addition, specialized facilities at the Statewide Air Pollution Research Center at U.C. Riverside and the Air and Industrial Hygiene Laboratory of the Department of Health Services also receive support from various ARB research contracts.

RECOMMENDATION SIX:

THE ARB SHOULD ENCOURAGE AND PARTICIPATE IN CALIFORNIA EPIDEMIOLOGICAL STUDIES WHICH WOULD HELP ESTABLISH THE RELATIONSHIP OF DISEASE AND GENETIC DAMAGE TO AIR POLLUTION BY DETERMINING WHETHER AREAS WITH ESTABLISHED PRESENCE OF TOXIC AND/OR HAZARDOUS SUBSTANCES IN THE ATMOSPHERE HAVE AN EXCESS OF DISEASE OR GENETIC DAMAGE.

Investigations and Enforcement Activities:

In cooperation with the Department of Health Services, the Air Resources Board is providing air monitoring data, approval of special air monitoring sites, and technical assistance in monitoring for polynuclear aromatic hydrocarbons as part of the DOHS-run studies of cancer incidence in Contra Costa County and the selected five county Bay Area. The purpose

of these studies is to determine if exposure of the population of these areas to industrial pollutants, either in the work place or in the community, or both, has lead to an increase in cancer rates. The ARB is monitoring these studies to determine whether regulations are needed to protect the health of residents of the area from hazardous air pollutants.

Research Contract:

<u>Title</u>	<u>FY</u>	<u>Amount (\$1,000)</u>
1. "Cancer Mortality-Incidence and Air Pollution in California". The investigators are re-examining existing data to determine whether there is a significant correlation between cancer deaths and air pollution levels in any of California's 58 counties.	78-79	37

RECOMMENDATION SEVEN:

STAFF SHOULD BE ASSIGNED TO FOLLOW ACTIVITIES IN THE FIELD OF ATMOSPHERIC TOXIC AND/OR HAZARDOUS SUBSTANCES, PARTICULARLY THOSE OF OTHER STATE AND FEDERAL AGENCIES AND TO REPORT PERIODICALLY TO THE BOARD ON THESE ACTIVITIES AS THEY APPLY TO CALIFORNIA, SO THE ARB CAN TAKE APPROPRIATE ACTION.

The staff of various Divisions of the ARB continuously monitor the activities of other agencies in the field of toxic and/or hazardous substance control. This is especially true of those Divisions responsible for formulation or evaluation of emissions control and ambient air quality standards.

TESTIMONY OF C. DEMING COWLES

BEFORE

SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE

SAN FRANCISCO FIELD HEARING

JUNE 29, 1979

I am Deming Cowles, Deputy Commissioner of the Alaska Department of Environmental Conservation. I appreciate this opportunity to present testimony on behalf of the State of Alaska concerning our hazardous waste management program.

According to the enabling legislation of the Department of Environmental Conservation, the environmental policy of the State of Alaska is "to conserve, improve and protect its natural resources and environment and control water, land and air pollution" and to "develop and manage the basic resources of water, land and air to the end that the State may fulfill its responsibility as trustee of the environment for the present and future generations." As the State agency charged with the responsibility for the "control, prevention and abatement of air, water, or land-or subsurface land pollution" the Department was given broad-ranging authority over discharges of oil and hazardous substances, environmental planning, State sewerage and water supply systems construction, municipal and industrial waste discharges, State permit coordination, regulation of landfill operations,

pesticide application, discharges of radiation and siting of all nuclear-related facilities in the State. The Department is the responsible agent for implementation of the Resource Conservation and Recovery Act, and as such is in the process of developing a solid waste management plan under subtitle (d). One aspect of the plan will be to address the problems of hazardous and toxic waste materials (subtitle (c)) in Alaska.

Problems associated with any environmental planning in regard to Alaska are put in focus by a few geographic statistics. Alaska comprises 17 percent of the total U.S. land mass, over 50 percent of the total U.S. coastline, and has over three million lakes larger than 20 acres in size. Approximately 40 percent of the total U.S. fresh water runoff occurs in Alaska. While vast in size, Alaska's population comprises only 0.2 percent of the total U.S. population with 50 percent of that in the greater Anchorage area, the only city with a population of more than 50,000. An additional 30 percent live in the remaining seven cities with a population in excess of four thousand. Large areas of Alaska's land mass consist of mountains surrounded by wet tundra covering near surface permafrost. In other areas of the State, extremely shallow soils and steep slopes present additional problems with the use of land for disposal of pollutants.

HAZARDOUS WASTE MANAGEMENT PROGRAM

Under Alaska's solid waste management regulations the Department has broad authority to regulate the disposition of hazardous and toxic wastes. Hazardous wastes are defined as those "capable of causing injury, disease or impairment of health, or property damage including but not limited to poisons, pesticides, acids, caustics, infectious or pathogenic wastes, radioactive materials, explosive materials, and oil and petroleum products." Toxic materials, equally broadly defined, include the section 307(a) pollutants of the Clean Water Act. Specific departmental approval for processing and disposing of hazardous wastes is required.

Alaska is not heavily industrial, and as such is not a major generator of hazardous substances, with the exception of oil in the form of crude and petroleum liquids. Currently there is only one approved landfill site for hazardous disposal. Loading, transportation and unloading of hazardous wastes are handled under broad regulatory authority.

Specifically: (1) Infectious pathological wastes are required to be incinerated prior to disposal of ash. (2) Waste oils are collected for use in road dust control under permit by our Department, reinjected into subsurface strata under permit by our Department, for heat generation for enhancement of the BTU value of coal in one Alaska coal mine, for shipment out of the State for re-refining, or burned in waste oil

burners. However, waste oil still represents a major waste disposal problem. (3) Materials contaminated from oil spills are generally incinerated prior to disposal at a permitted landfill site. (4) Perhaps the greatest quantity of industrial pollutants is generated from the oil industry in the form of drilling muds and produced brines. Those substances are not currently subject to RCRA regulations. Produced brines and waste oils are generally reinjected on the North Slope and in some areas of the Cook Inlet. Drilling muds are disposed of in drilling pits on the North Slope, with the location recorded with the State Oil and Gas Conservation Commission. The hazardous waste disposal facility in Sterling, Alaska, is used for the disposal of oil-based drilling muds from the Cook Inlet production fields. (5) State policy limits the use of pesticides in the State for public purposes. Where spraying is allowed by our Department, type, location and method of spraying are stringently regulated. Disposal of empty cannisters is in accordance with federal pesticide legislation.

Alaska does have an incipient refining industry, chemical production industry, and a major ballast water treating facility. The Alaska Water Quality Standards were recently revised to impose perhaps the most stringent aromatic hydrocarbon and total hydrocarbon restrictions in the nation to protect against the disposal of benzene, toluene, xylene and other similar hazardous hydrocarbon substances. No

significant solid wastes of a hazardous nature are generated for disposal in the land as a result of these operations.

Because there is only one sanctioned hazardous waste disposal facility in-State, many hazardous wastes that are generated must be transported out of State to properly equipped facilities for treatment and disposal. The Department is concerned that such a situation may encourage illegal disposal of hazardous materials in-State, and may be further exacerbated by the growing attitudes of most states against receiving hazardous wastes from other states for disposal.

The need to plan for long-term disposal of hazardous wastes becomes even more important when one looks at the development possibilities for Alaska. We can predict that the major sources of hazardous wastes in the future will be centered around petrochemical and refining development and increased generation of waste oils from increased population. Further, new industrial development in Alaska will result in more stringent environmental control (such as new source performance standards, best available technology and prevention of significant deterioration) which may increase the amount of pollution control equipment by-products for disposal.

INSTANCES OF HAZARDOUS RELEASES

There has been a sizable presence of federal government activity in Alaska over the last 30 years. Federal military

installations and federal oil exploration operations have resulted in abandoned waste materials that, with the exception of oil drums, have caused solid waste problems but are not generally thought to have created hazardous waste problems. The Army has reported that after a one and a half year test of a small nuclear power plant at an Army base in Fairbanks in 1950, all waste materials and the plant itself were removed from the State.

The State has frequently been subjected to the release of hazardous substances through the spillage of crude oil and petroleum products during oil exploration, production and transportation operations in the State. Those occurrences, of course, are not intended to be controlled under RCRA but rather under State and federal oil and hazardous substances spill control measures. These types of releases are serious in light of the dependence of Alaskans on our environment for our fisheries, tourism, recreation and the like.

It is true that our information about the occurrence of hazardous and toxic substances in Alaska's environment is a combination of current permitting and management practices, and not the result of a detailed inventory or study. While the State of Alaska lauds the goals and objectives of the Resource Conservation and Recovery Act with regard to hazardous substances, it currently believes that adoption of the subtitle (c) program may well not be cost effective for Alaska. It is our initial reaction, perhaps substantiated

in part by reading of the proposed regulations and guidelines, that leads us to conclude that at least as far as Alaska is concerned the program may well be more complex than the current state of knowledge of our problems would justify. While Alaska, like its western sister states, prefers to control as much of its destiny as possibly with regard to control of its environment, it is not clear that management of the subtitle (c) program would provide as much service to the people of the State of Alaska as would expenditure of a similar amount of time and money on research into resolution of the types of solid waste problems facing Alaska now and in the future. We are concerned with two specific elements of the subtitle (c) program, namely the intricacy of the manifest system to trace hazardous substances "from the cradle to the grave" and the question of how reliable an historic inventory would be in determining whether there are any "Love Canals" in Alaska. At this point it is difficult to imagine how successful would be an inventory which could be no more than a cursory review of abandoned mine sites, existing industrial and municipal landfills and the hopes of general cooperation from the current managers of federal facilities in Alaska.

There is one catch 22 aspect of the currently proposed regulations. While we strongly believe that financial responsibility should be required for operators of hazardous waste disposal sites, it is not clear that the amount of

wastes generated in Alaska will support the costs generated by the provisions for financial responsibility, the trust funds for closure, and the like. If such facilities cannot be supported by the private sector, the Department may well need to contemplate the State ownership or operation of a hazardous waste disposal facility in order to meet projected need. On the other hand, not to require such financial arrangements may result in poor management and insufficient resources to satisfy claims.

In essence, while we recognize the great value in a strong hazardous waste management plan, we may ultimately prefer to use our limited resources in attempting to resolve the major solid waste problems in Alaska while allowing the Environmental Protection Agency to regulate the important but less frequent problem of cradle to grave handling of hazardous materials. Of course, if our subtitle (d) inventory and further evaluation indicate more of a problem than is now apparent, taking over the subtitle (c) program becomes a more distinct possibility.

ALASKA LAW

While the State has made no final decision to assume the regulatory aspects of subtitle (c), it does currently have strong enforcement capability. Alaska law provides for strict liability of the person owning or controlling a hazardous substance which enters the waters, surface or subsurface lands of the State in the event of damages to

persons or property, whether public or private (AS 46.03.822). Such person is relieved from strict liability only in the event the discharge or release was a result of an act of war, the intentional act or negligent act of a third party other than one in a position of privity or employment, or the event of an act of God or negligence on the part of the U.S. Government or the State of Alaska. In order to avail himself of relief of strict liability, the owner or controller of the substance must also prove that he discovered the entry of the hazardous substance and began operations to contain and clean up the substance within a reasonable time (except in the case of an act of war). Damages that are recoverable include but are not limited to injury to or loss of persons, real or personal property, loss of income, loss of the means of producing income or the loss of an economic benefit (AS 46.03.824). An economic benefit is measurable in economic terms, including gathering food or other items in a subsistence economy and their replacement cost. Recovery under this provision is an exclusive remedy.

In the event the discharge of hazardous substances causes the death of fish, animals or vegetation or otherwise "injures or degrades the environment of the State" the perpetrator of the spill is liable to the State for natural resources restoration damages (AS 46.03.780). That liability includes an amount equal to "the sum of money required to restock injured land or waters, to replenish a damaged or degraded resource, or to otherwise restore the environment of the

~~State to its condition before the injury.~~" Damages under this section are recoverable by the attorney general on behalf of the State.

Recognizing the threat to Alaska's environment and economy from oil spills, the State Legislature adopted special civil penalties for discharges of oil, including petroleum products, into the environment (AS 46.03.758).

Under the civil penalty provisions, the environment is designated as freshwater, marine and public land. Under the general category is a further specific delineation into critical, very sensitive or sensitive environments, and environments without significant resources. Critical freshwater environments include (1) anadromous rivers, streams and lakes and their sources, (2) waters and wetlands within National Wildlife Refuges and their sources, and (3) Alaska-designated critical habitat areas, sanctuaries, and fish reserves and their sources. Sensitive freshwater environments include lakes, freshwater wetlands and subsurface waters not considered critical. Freshwater not designated critical or sensitive is considered without significant aquatic resources. Similarly for marine environments, marine water within State game refuges, fish and game critical habitats, federal marine sanctuaries, National Wildlife Refuge System, one mile of the mouth of anadromous waters, seabird colonies and marine mammal rookeries, barrier islands of the North Slope,

the Copper River Delta area are all critical. Sensitive areas are inside waters of Southeast Alaska, Prince William Sound, saltwater marshes and estuaries not designated as critical, including all marine water within 10 statute miles of critical marine areas. Critical terrestrial environments are State parks, refuges, reserves and sanctuaries, national parks, preserves, refuges, wilderness and monuments and municipal parks. Very sensitive areas include most lands under the jurisdiction of the U.S. Forest Service, land underlain by permafrost, and State forest lands not designated critical. Sensitive areas are all other lands covered with continuous natural terrestrial vegetation.

The regulations grade petroleum and petroleum products and by-products as highly toxic, moderately toxic, less toxic, and relatively non-toxic, and assign products with such designation. For example, gasoline and heating oil are highly toxic, crude oil is moderately toxic, bunker oil is less toxic and ashpalt is relatively non-toxic. Further, the regulations define the degree of degradability and dispersibility of petroleum. The regulations, then, establish a civil penalties matrix by general and specific designations of water and land, and set out a factor for degrees of toxicity, degradability and dispersibility of oil. The net civil penalty is determined by multiplying the base penalty by the mean of the factors for toxicity, degradability and dispersibility times the estimated number of gallons.

Penalties for oily reaching more than one type of receiving environment will be based on the most sensitive receiving environment. In the event the spill was caused by the gross negligence or intentional act of the discharger, or in the event the court finds that the discharger did not take reasonable efforts to clean up the discharge, the penalty is multiplied by a factor of five.

No similar approach currently exists for other hazardous substances. Rather, there exists a general civil action for pollution which provides for penalties ranging from \$500 to \$100,000 reflecting reasonable compensation in the nature of liquidated damages for adverse environmental effects caused by violations, such as releases of hazardous substances (AS 46.03.760). The reasonable compensation will be determined in the court on the basis of toxicity and dispersal of the contaminant and sensitivity of the environment. The penalty shall also take into account the State's efforts to correct the violation and the "economic savings" realized by the violator. Penalties under this section are specified to be compensatory and remedial, and expressly not punitive in nature. Incidentally, economic savings is defined as the sum which "a person would be willing to expend for the planning, acquisition, siting, construction . . . and operation of facilities" to avoid violation. In addition, the violator is subject to the State, in a civil action, for the full amount of actual damages caused to the State,

including direct and indirect costs of cleanup and restoration of the environment to the natural state.

The State of Alaska established a coastal protection fund to protect against the discharges of oil spills (but not other hazardous substances). That fund was intended primarily to pay for cleanup costs, as well as administrative costs and research and development expenses. However, third party damages were not collectible from the \$30 million fund. Unfortunately, this fund, along with the State's major efforts to protect its coastline through control of oil shipping, have been invalidated as the result of litigation brought by the oil industry.

While we have not had sufficient opportunity to review in great detail the administration's proposed "ultra-fund," this Department has endorsed, and has previously testified before this Committee concerning, the concept of comprehensive oil spill and hazardous liability funds with certain specific exceptions. Generally, we believe that damaged parties should have sure and prompt recourse for all damages resulting from the release of oil or other hazardous substances into the environment, including ground water and land. We would, in passing, point out that the definition of petroleum should include a definition of LNG. Although cleanup from an LNG facility might be insignificant, damages to real and personal property, as well as natural resources, would not

be reFurther) the degree of recoverable damages is not sufficiently broad to cover all losses of use of real or personal property and loss of use of natural resources. The bill does appear to provide strong incentives to mitigate potential spills and to encourage cooperation in cleanup by the spiller. We will be more than pleased to provide a detailed position after we have reviewed the legislation.

CRAWFORD & COMPANY

RON DENOVILLE
GENERAL MANAGER

ENVIRONMENTAL POLLUTION CLAIMS DIVISION
VENTURA CALIFORNIA 93003

TELEPHONE (805) 644 2271
5740 RALSTON ST SUITE 116 P.O. DRAWER 5232

• Senator Edmund Muskie
Senator John Chafee
Senate Sub-Committee on Environmental Pollution
and Resource Protection

Re: Senate Sub-Committee Hearing on Natural Resources Damage
Assessment, June 29, 1979 San Francisco, California

Gentlemen:

For your information, Crawford and Company is the second largest independently owned adjusting company in the world with over 700 offices located in major cities throughout the 50 states. Almost 100% of our adjusters are college graduates.

To the best of our knowledge the Environmental Pollution Claims Division of Crawford and Company, which is directed by this writer, is the only organization in the world which is solely dedicated to the handling of environmental pollution claims (oil/hazardous material spills). In the past 10 years we have handled 115 environmental pollution spills which included more than 37,000 claims and 14 separate class actions. Included in these class action spills, was the Santa Barbara Oil Spill of 1969 which produced 5 billion dollars in class action demands and the San Francisco Oil Spill of 1971 which produced 8 billion dollars in class action demands. We have established an excellent working relationship with the various Federal Agencies, whc are involved in environmental pollution spills (Coast Guard, EPA and NOAA). We are also accustomed to closely working with various state agencies who are involved in environmental pollution spills such, as Water Quality Control, Fish and Game, etc. Environmental pollution claims division clients include:

Insurance Industry
Oil Industry
Railroad Industry
Shipping Industry
Steel Industry
Federal Government
State Governments
Cleanup Co-Ops
Foreign Clients
Miscellaneous Clients

During our heavy involvement into the environmental pollution claims field, we have formed the opinion that the various claim functions and damage assessment functions, which are utilized in oil spill adjusting, are very similar to those utilized in hazardous material spill adjusting. The main difference is that hazardous material spills create a far larger number of Bodily Injury Claims than those produced

from oil spills.

As we have extensive experience in handling major, medium and minor environmental pollution spills (as described by the National Oil and Hazardous Substances Pollution Contingencies Plan), we would like to report our observations.

MEDIUM, MINOR DISCHARGES

We have observed that the large majority of medium and minor discharges do not involve Federal, State or Municipality type claims. This non-claim situation from a claims standpoint, then makes the assessment of damage to natural resources unnecessary. This non-claim situation primarily results from the following:

1. Because of excellent cleanup results and because of the total voluntary cooperation of the spiller, the Federal, State or Municipality Government, elects not to present a claim.
2. The visual damage to natural resources appears to be negligible or non-existent.
3. The biological, statistical or scientific studies associated with determining damage to natural resources, is more expensive than the estimated amount involved in the environmental damage.
4. Local politics may discourage processing environmental resource damage claims.

MAJOR DISCHARGES

Every major spill presents the potential exposure of a Federal, State or Municipality type claim for damage to the natural resources. Because of excellent cleanup results; because of the complete voluntary cooperation of the spiller; and on occasion, because of the local politics; we have observed that even in major environmental pollution spills, Government/State/Municipality type claims for damage to the natural resources are not filed in the first place or are later withdrawn. At most, we would estimate that no more than 50% of major spills result in Government/State/Municipality claims for damage to the natural resources.

Since a very high percentage of reported environmental pollution spills are medium or minor discharges which do not normally result in claims for damage to natural resources and because at least one half or more of the remaining major spills do not result in claims for damage to the natural resources, it can be stated that only a very small percentage of environmental pollution spills require, from a claims standpoint, the necessity to determine damage to the natural resources. In other words, in reality, only a small number of claims for damage to the natural resources are ever pursued after satisfactory cleanup has been completed.

As only a small number of environmental spills result, which require the assessment of damage to natural resources, the "state of the art" has not been completely developed and is far from being an exact science.

STATE OF THE ART

We have observed in both California and other states that generally the concept of assessment and recovery costs for damage to natural resources, is handled in the following way:

The State or Municipality presenting the claim utilizes the expert opinions of marine biologists, chemists, mining engineers, statisticians, economists or other professionals of relevant disciplines to determine the statistical loss count of the environmental resource. We have observed that sampling techniques which determine the statistical loss count can be very questionable. This particularly is true regarding a fish kill count. Once, however, the statistical loss count is determined unit price standard, such as that developed by the State of California, (the representative of the State Attorney General's office will thoroughly explain this system) or the Fishery Society (monetary values of Fish) are utilized to expand and project the loss. These unit price standards normally involve actual cash value (market value) or replacement cost. While estimates for either actual cash value or replacement cost can be made, these values can be highly questionable. Generally, on the Plaintiff side, an attempt is made to gain the highest possible figure such as the California State Claim Demand in the Santa Barbara Oil Spill of 1969 (500 million dollars-this included all claims of the State of California).

On the Defendants (Spiller) side, we have observed that the statistical loss counts are established by Marine Biologists, Chemists, Statiticians, Economists and professionals in relevant disciplines, just as the Plaintiff (State/Municipality) side has done, but these statistical loss counts may be different than those used by the Plaintiff. The unit price standard may be entirely different from those utilized by the Plaintiff. As both the Plaintiff and the Defendant utilize different statistical loss counts and unit price standards, lengthy negotiations become involved. These negotiations can take years to resolve and in the case of the 1969 Santa Barbara Oil Spill, after 6 1/2 years, the State of California received 4.5 million dollars for their total claim.

It is obvious that the assessment of damage to natural resources is not an exact science and therefore negotiations form a major part of how the final settlement amount is obtained, which in essence, is a negotiated compromise. To the best of our knowledge, the State of California operates under this system.

DISCUSSION AND SUMMARY

As in Federal Super Fund Legislation, Outer Continental Shelf Legislation and State Super Fund Legislation, California has difficulty in scientifically determining damage to the natural resources.

As discussed above, the final claim resolution for damage to natural resources, in the State of California, is a negotiated compromise amount.

The environmental pollution claims adjuster, in order to solve the tremendous problems associated with evaluating damage to natural resources, must rely on the expert opinions of marine biologists, chemists, statisticians, economists, and professionals in relevant disciplines. While the adjuster may accomplish investigation in regards to environmental damage claims, he may not always negotiate the actual final settlement, as this is sometimes done by attorneys, (particularly in major spills).

State/Municipality claims with associated damage assessment to natural resources is only a small part of the over all activities which are accomplished by the environmental pollution claims adjuster during a major or minor spill. For your further reference, enclosed is a copy of a speech delivered by this writer at the 1979 Oil Spill Conference which describes adjuster activities including a discussion of State/Municipality claims. We also enclose for your reference a brochure on the Environmental Pollution Claims Division of Crawford and Company.

Thank you for your courtesy in this matter and for inviting this writer and Crawford and Company to participate in the hearing.

Very truly yours,

Ron DeNoville, Director and General Manager
Environmental Pollution Claims Division
Crawford and Company

RDN:bjs

Encl: 1979 Oil Spill Conference Paper
Environmental Pollution Claims Division Brochure

1979 OIL SPILL CONFERENCE - LOS ANGELES CALIFORNIA

ADJUSTING AND HANDLING OIL SPILL
POLLUTION CATASTROPHE CLAIMS

Ronald C. DeNoville
Director and General Manager
Environmental Pollution Claims Division
Crawford & Company
P.O. Box 5232
Ventura, California 93003

ABSTRACT

Large oil spills create claims adjusting and handling problems quite different from those associated with regular claims. The differences emerge in this paper, which deals with types of claims, approaches to them, damage assessment, and the future of oil spills adjusting. The resolution of claims in such a way as to be acceptable to both the public and the spiller rests on the adjuster's complete fairness and thorough consideration of all claims.

INTRODUCTION

Ten years' experience in handling 112 separate oil spills involving more than 37,000 claims has demonstrated to the author that oil spill claims adjusting is quite different from regular claims adjusting. It should be noted that many of the adjusting principles and procedures associated with oil spills also apply to hazardous substance spills.

Insurance companies do not become involved in every oil spill. Frequently, affected companies provide their own protection with self-insurance. Larger spills may involve a combination of insurance and self-insurance, depending on the type and extent of coverage purchased prior to the spill. Further, the insurance involved can be either foreign or domestic, and this is largely determined by the type of coverage desired. Different coverages are available for refineries, platforms, oil tankers, pipelines, and other facilities. The coverage or underwriting of the spiller can be quite complex.

Liability

Liability must be determined as early as possible, since such determination bears directly on the different courses of action available to the spiller. The following degrees of liability, for example, dictate whether, and how soon, resolution of claims problems occurs:

No liability to the spiller. This determination may result in the spiller's denying all claims and taking no action.

Questionable liability to the spiller. This determination may result in delayed resolution of claims while the spiller is determining his liability status. In some cases, the spiller may elect to resolve all claims, but to protect himself by gaining the assignment of each individual claim as the claim is resolved. In this manner, if such is justifiable, the spiller can then seek indemnity through the courts.

Clear liability to the spiller. Normally, clear liability to the spiller results in prompt resolution of all proper claims.

Type of Spills

Two distinctive types of spills involve different magnitudes of losses and require different methods of handling:

Small or moderate spills. These usually involve individual claims, which are most often handled in the same way as normal claims unrelated to a spill.

Large or major spills. These may result in multitudes of individual claims and can in fact generate class actions. Class actions, if they do materialize, generally complicate the situation by increasing legal involvement and the amount of time necessary to resolve the claims. Billions of dollars of demands have resulted from some class actions.

Adjusters and their responses

Immediate action at the time of the oil spill is necessary, and it is mandatory that the oil spill adjuster be a part of the original response team. In a very real sense, his work relating to the proper handling and resolution of claims arising from the spill begins on the day of the spill. The earlier he begins his work, the more beneficial is the overall settlement to the public and the spiller.

The immediate basic responsibility of the oil spill adjuster is to determine monetary exposure and reserves. Until control of all claims and related matters is achieved, the oil spill adjusting crew must literally work 12-hour days and seven-day weeks. Once claim control is established, the adjuster can begin working more nearly normal hours. But adjusting activities must continue on a seven-day basis, because many claimants with jobs are free to consider their claims only on weekends.

Because of the political and economic impacts of oil spills, only the most experienced adjusting personnel should be involved. One reason is that improper handling of an oil spill could lead to a class action which otherwise might have been avoided.

TYPES OF CLAIMS AND APPROACHES TO THEM

A major oil spill gives rise to three types of claims: class action claims, state and municipal claims, and individual claims. Of these three types, class action claims are far and away potentially the most devastating.

Class Action Claims

A class action is an action filed by one person on behalf of himself and others who are similarly affected. If, for example, that person should believe his damage to be \$10,000 and 10,000 other people were similarly affected, then the law suit would involve \$100 million.

The magnitude of class actions--again, potentially the largest area of exposure resulting from an oil spill--often rests on a number of basic elements. For example, a political issue may be involved, such as offshore drilling or oil shipping in harbors and along coasts. The spill may occur in an area of dense population. A resort area may receive damage. Or a spill may involve a combination of these and other elements, in which case the financial implications of an oil spill class action tend to be huge.

History reveals that most class actions filed in the past were ultimately withdrawn. This was not the case, however, with the Santa Barbara spill of 1969 and the San Francisco Bay spill of 1971. Each resulted in billions of dollars of class action claim demands.

The Santa Barbara spill gave rise to the following class actions: boat owners, beach front property owners, fishermen, hotels and motels, nautical suppliers, beach users, and bird watchers. Of these, the federal judge dismissed only the suits brought by beach users and bird watchers. Class action claimants in the San Francisco Bay spill included boat owners, property owners and lessees, fishermen, volunteers, and beach users.

Judicial recognition of a class action does not uphold the demands of the class, but it can create complex problems. The Santa Barbara spill, involving private boats, provides an example of a "runaway" class action. There, some 2,100 individual claims--about 95 percent of all boat claims --were settled. Nevertheless, the federal judge upheld the class action, despite the previous settlements and the fact that 95 percent of the boat owners had already signed notarized releases and notarized affidavits indicating that they did not want to be part of a class action. Approximately one year after the spill, notices and claim forms went out to 13,000 prospective claimants--that is, to every boat owner in Santa Barbara and Ventura Counties.

The Santa Barbara spill mailings contained the names and addresses of the class action attorneys and instructions on how to file a claim. The result was an upsurge of filings. But the complexity of class action claims

can be escalated in any number of additional ways. The claimant attorney, for example, may solicit claims by appearing on television or radio, conducting "chain" telephone calls, sending letters to prospective claimants, and conducting door-to-door interviews through homeowner's associations.

The federal judge tends to protect the public much as a civil court protects a minor--that is, by giving the public the benefit of any doubt. He also may review settlements of prior claims to assure fairness and in some cases, even though the claimant has signed a release, may order that an additional amount of money be paid. Finally, the federal judge makes sure that every one has a fair chance to make a claim and may, as was the case with the Santa Barbara spill, order all persons to obtain legal representation unless their claims were under \$300. Claimants could have "opted out," but most did not.

In light of the potential for class action claims to develop--with all of the attendant complexity, confusion, delay, and expense--oil spill adjusters should take great care to observe certain proven principles and procedures:

Solicitation of claims. Normally, the adjuster does not solicit claims. In the case of class actions, however, he must do so to balance the efforts of class action attorneys rushing to sign up claimants for entry into the class. To assist in discovering and settling legitimate claims, the adjuster should consider such methods of solicitation as posters, radio and television announcements, newspaper articles, and public meetings.

Public affairs efforts. The adjuster should play a major role in coordinating cleanup operations, legal actions, and public relations statements, the aim being to bring together concerned groups in such a way as to assist and benefit both the public and the spiller. All claims, no matter how small, must be promptly and fairly considered. It is beneficial, for example, for adjusters to work out of trailers at the scene of the oil spill, where claims can be settled promptly. It is also beneficial to communicate openly with the public--particularly through such interested groups as fishermen, boat owners, and homeowners--and with public officials. To the extent that he earns goodwill, the adjuster discourages class actions, minimizes litigation, and reduces exposure.

Payment of claims. The adjuster must strongly resist paying fraudulent claims. He must also resist overpayment of claims, since this tends to set an unwanted precedent. But he must also avoid underpayment of claims, which is apt to generate dissatisfaction and unwanted problems. His guiding principle, always, is to pay what in his best judgment is owed, neither more nor less.

Timing. The timing of claim denials can be extremely important. If announced too early, a denial can have adverse effects on pending legitimate claimants, who may regard any denial as a threat to their own claims. For this reason, it is frequently the wiser course to postpone denials of claims until legitimate claims have been settled.

Many claims cannot be adjusted as long as oil remains on the water. One reason is that a claimant may not be aware of all of the damages resulting from the spill. Another is that "re-pollution" may occur--for example, in the cleaning, then re-oiling of boats.

Identification. Prior to settlement, the adjuster should make positive identification of all claims and claimants. It is not unknown, for example, for people to try to collect damages for pleasure boats when in fact they do not own pleasure boats.

A variation on this theme occurred with claims for considerable amounts of clothing damaged during one West Coast oil spill. The clothing damage was promptly reimbursed, and the claimants were allowed to take back the clothing on the assumption that they would destroy it. Over a period of several weeks, however, adjusters noticed that some of the same articles of clothing were reappearing in the hands of new claimants. It became necessary, after settlement, for the adjuster to retain and destroy the oil-damaged clothing.

Identification methods--particularly those dealing with the type and origin of oil on a boat, clothing, or other property--are extremely helpful in eliminating fraudulent claims. Such was the case in one spill when a number of people rubbed articles of clothing in street oil, then presented them as evidence of oil spill related damage.

Photographic evidence. The adjuster should take photographs, both from the air and on land, so as to record damage and potential damage. Once the spill has been cleaned up, it is virtually impossible to determine accurately where the spilled oil originally lay. It is important for the adjuster to know just which areas were affected. It is equally important for him to know which areas were not affected. Such knowledge assists in putting into perspective the claims, legitimate or questionable, that come to his attention.

Adjusting responsibility and authority. For reasons of efficiency and proper handling, the adjuster should be able to write his own marine appraisals and should receive release and check authority early. Armed with accurate appraisals and blank releases and checks, he is in a position to handle claims fairly and promptly. He is also in a position to respond to emergencies-- for example, to those occasions when for reasons of safety claimants must be evacuated and their immediate living expenses paid.

State and Municipal Claims

Following a major oil spill, a state or a municipality may file a claim. Millions of dollars can be involved. And it may take several years of negotiation and, in some cases, litigation to resolve a large claim. An early showing of good faith and conscientious effort on the part of the adjuster are imperative and can be instrumental in a state or municipal decision to withdraw a claim or even not to file a claim in the first place.

A state claim usually involves damage to natural resources. Assessment of such damage is far from being an exact science. To help him solve the tremendous problems associated with evaluating damage to natural resources, the adjuster should rely on the expert opinions of marine biologists, chemists, statisticians, and other professionals in relevant disciplines.

Individual Claims

Thousands of individual claims may result from an oil spill. Some include loss of use, loss of property value, and loss of rent. Others include claims of fishermen, hotels and motels, private boat owners, beach front property owners, beach users, and volunteer laborers. In handling these types of claims, the adjuster must take into account "mass psychology" in the sense that what he does for one person may well set the trend for what he must do thereafter for all others. Each claim must be investigated and handled on its own merits.

In all cases, depreciation must be taken into account, the aim being to return the claimant to his position prior to the spill, but not to a superior position. Alleged business losses or loss of income must be subjected to extremely thorough consideration and analysis to avoid post hoc ergo propter hoc (after this, therefore on account of this) claims. All too often, businesses that have incurred losses for the full year attempt to blame such losses on the oil spill, when the true loss factors may include extremely bad weather, new competition, and the presence of other pollutants.

Finally, it has been demonstrated that businesses can actually gain income for the year because of the oil spill. Hundreds of cleanup workers and other interested persons working on the oil spill, including government officials, flow into the area and generate increased income above the normal. Even the curious public, traveling to see the spill, brings to the area money which normally would not have entered the economy of that area.

DAMAGE ASSESSMENT

The adjuster encounters four basic types of damages, each requiring a different approach.

Non-existent or fraudulent claims

There always seem to be a certain number of individuals who attempt to profit from crises by advancing unsupportable claims. Such claims should be denied, since paying them would only encourage additional fraudulent claims. As noted above, however, denial of a fraudulent claim can arouse anxiety and anger in those with legitimate claims. It is therefore recommended that denial of fraudulent claims be postponed until all legitimate claims have been settled.

Real Physical Damage

This type of damage results from direct contact of the oil on all types of property, including private vessels, fishing vessels, clothing, and the like. Appraisals or verifications of loss by the adjuster take care of this type of damage. Once again, the claims adjuster should be able to write his own marine appraisal so as to allow prompt and efficient resolution of claims.

Combination of Real and Nebulous Damage

Included in this category are alleged losses of current income of fishermen, restaurants, hotels and motels, and various other businesses. Also included is the rental loss related to beach front homes. The books and records of, say, hotel and motel owners should be carefully examined to calculate the loss of income, but it should be kept in mind that the figures arrived at through conventional accounting methods may not reflect the amount of loss to be attributed to the oil spill. As noted above, outside nebulous factors often affect loss--again, bad weather, new competition, and the presence of other pollutants. The adjuster must take great care to prevent the writing off of business losses not directly connected to the spill.

Nebulous Damage

This category--which includes alleged losses such as future income, use, property value, and natural resources--is the most controversial area of damage assessment. Human concern, perhaps touched with human greed, is understandable. But the plain fact is that future losses that can be attributed to an oil spill are rare.

There may well be a temporary loss of value to beach front property during the existence of an oil spill. But over the long run, property values are not affected. This conclusion is supported by the fact that tax assessors normally refuse to lower the taxes on beach front property following a spill.

Given the controversial nature of nebulous damage, it is recommended that the adjuster draw on the experience of highly qualified experts in science, economics, real estate, and other relevant professions. It is also recommended that he approach assessments of nebulous damage with a large store of common sense and a spirit of compromise.

FUTURE OIL SPILL ADJUSTING

Countries around the world are increasing efforts to assure that their citizens are compensated for damages resulting from oil spills. Here in the United States last year, Congress considered but did not enact legislation called the Comprehensive Oil Pollution Liability and Compensation Fund,

commonly known as the Superfund. It is highly likely that similar legislation will be introduced in Congress this year.

Creation of such a fund would guarantee all citizens a proper and fair recovery in the event that damages could not be collected from the spiller. Superfund would set forth the types of damages which are collectible. Finally, it would spread the risk of an oil spill or hazardous substance spill disaster to the entire public, as opposed to penalizing just the coastal states or the spiller for the pollution damage.

Some states have already enacted compensation laws. It is probable that similar action will be taken at the federal level in the near future. Given the growing interest in oil and hazardous substance spill compensation both here and abroad, it is virtually certain that demand for the services of qualified adjusters will increase sharply in the years ahead.

CONCLUSION

Scrupulous fairness is necessary in the adjustment of oil spill claims. The author has found that industry is in complete agreement. Now more than ever before, industry, government, ecologists, and other concerned organizations and individuals must work together to solve the problems associated with oil spills. To the extent that voluntary cooperation among these groups and individuals can be achieved, the nation will have the energy that it needs and the environment that it wants.



RON DE NOVILLE,
GENERAL MANAGER

Insurance Adjusters
ENVIRONMENTAL POLLUTION CLAIMS DIVISION
VENTURA, CALIFORNIA 93003

TELEPHONE 1805/644 2271
5740 RALSTON ST. SUITE 114 P.D. DRAWER 5232

ENVIRONMENTAL POLLUTION CLAIMS SERVICE

Crawford and Company has established a special Environmental Pollution Claims Service office which can be on the scene of an environmental occurrence anywhere in the world within 24 hours or less, depending on travel conditions.

In the last 10 years, we have successfully handled more than 37,000 environmental pollution claims arising out of 112 separate oil or hazardous material spills which included the following:

Santa Barbara, CA oil spill of 1-28-69 (6 Class Actions) for Union, Texaco, Gulf and Mobil Oil Companies.

Catalina Island, CA oil spill of 1-20-70 for Western Oil and Gas Assn.

San Francisco, CA oil spill of 1-18-71 (5 Class Actions) for Standard Oil Company of California.

St. Croix-U.S. Virgin Islands oil spill of 6-12-71 (1 Class Action) For Atlantic, Gulf and Pacific Company (consultants).

Cherry Point, WA, USA/White Rock, Canada oil spill of 6-4-72 for Atlantic Richfield.

San Pablo Bay, CA oil spill of 8-23-72 for Union Oil.

Los Angeles Harbor, CA oil spill of 12-23-72 for Union Oil.

Oakland Estuary, CA oil spill of 1-18-73 for Clean Bay, Inc. (consultants).

St. Lawrence River, NY oil spill of 4-15-74 for Exxon/Imperial Oil Co., Ltd.

St. Lawrence River, NY oil spill of 6-23-76 for New England Petroleum.

Suisun Bay, CA oil spill of 10-30-76 for Atlantic Richfield.

San Francisco, CA oil spill of 2-10-77 for Bethlehem Steel.

San Francisco, CA oil spill of 4-10-77 for States Steamship Company.

Lake Ontario, Canada ink spill of 8-4-77 for the Toronto Star.

St. Francis River, AR chemical spill of 2-10-78 for Missouri-Pacific RR.

St. Marks River, FL oil spill of 7-12-78 (1 Class Action) for Water

ENVIRONMENTAL POLLUTION CLAIMS SERVICE

Quality Insurance Syndicate.

Fallon, Nevadas underground gasoline spill of 2-28-79 for Trsvelers Insurance Company.

Please consider the following:

1. We have heavy experience in the defensive handling of large Class Actions associated with oil spills/environmental pollution occurrences.
2. Our men are trained to work and coordinate with your Public Relations Unit in order to hold down adverse publicity. We also are accustomed to closely coordinating with the Legal Unit and the environmental pollution cleanup operations unit.
3. Consultation service is available both nationally and internationally.
4. Contingency Planning Service is available regarding the defensive handling/adjusting of Class Actions related to environmental pollution occurrences.
5. Our adjusters write their own small craft appraisals.
6. We can furnish any number of adjusters for any length of time, depending on the requirements of the individual environmental pollution exposure.

The following summary covers the experience, activities and references of our Environmental Pollution Claims Division:

1. We have handled 4 major oil spills in the United States which resulted in Class Actions. Demands associated with Class Actions amounted to \$5,000,000,000 in the Santa Barbara, CA Spill; \$8,000,000,000 in the San Francisco, CA Spill; \$36,000,000 in the St. Croix, U.S. Virgin Islands Spill; and \$30,000,000 in the St. Marks, FL Spill. These four above mentioned oil spills involved 14 separate Class Actions which are as follows:

Three Property Owners Class Actions; Two Fisherman's Class Actions; Two private Boat Owner's Class Actions; Three Beachfront user's Class Actions; Volunteer labor Class Action; Seller of Nautical Supply Class Action; Hotel and Motel Class Action; and Birdwatcher's Class Action.

2. We have accomplished major baseline research for Exxon in regards to Contingency planning relating to the adjusting and handling of Class Action related oil spills/pollution.
3. In regards to additional activities on our part related to the growing impact of oil spill related Class Actions and the desire to prepare for same, we have been involved in giving 12 major speeches (see attached list), have attended many conferences and symposiums, have had several meetings with the Coast Guard and the E. P. A. in Washington, D.C. and have met and coordinated with several cleanup co-op groups.

ENVIRONMENTAL POLLUTION CLAIMS SERVICE

4. We have been invited to the Home Office of almost every major oil company in America to discuss our services with their insurance/risk managers.
5. We have a contract with Oil Insurance Limited/Bermuda who controls a large number of offshore platforms around the world.
6. References (see attached reference list and letters).

REMARKS: We have found that the largest financial exposure for a potential polluter is in the various resort areas of the United States. More than 90% of the spills which we have handled have been in resort areas to further prove this point. These would include the St. Lawrence River, NY, San Francisco, CA, Vancouver, Canada, St. Croix/Virgin Islands, Santa Barbara, CA, St. Marks, FL, etc. We find that other factors which increase exposure include large volumes of people or where local political issues exist on pollution or transportation of energy. If an area is a resort area, is heavily populated and also has local pollution issues which are being hard fought, the financial exposure resulting from an oil spill/pollution event in this type of area would be huge.

In an oil spill/pollution claim, the two basic areas of exposure are cleanup and claims. Both of these can be expensive, such as the recent cleanup of the St. Lawrence River, NY which required \$10,000,000 and the claims payments resulting from the Class Actions and State Claim in the Santa Barbara, CA which exceeded \$16,000,000. Our basic function is dealing with the claims exposure. We also monitor oil spill/pollution cleanup and expenses to make certain that your cleanup dollar is "well spent".

During a major oil spill/pollution disaster, we deal with three types of claim situations which are:

1. Class Actions
2. State Claims
3. Other individual claims

Class Actions - Of the above, the Class Action can be the most devastating and can take in excess of 5 years in Federal Court to resolve. Our oil spill/pollution adjusting catastrophe team approaches the Class Action potential by accomplishing activities which tend to prevent Class Actions from happening in the first place, activities which help to defeat the Class Actions after they have been filed and, finally, activities which tend to limit the Class Actions once they have been upheld by the Federal Court.

State Claims - These types of claims can frequently run into the millions of dollars and it takes a very specialized political and coordination approach to avoid same.

Individual Claims - Thousand of these may result from an oil spill which might include loss of use, loss of property value, loss of rent, claims of fishermen, claims of hotels/motels, claims of private boat owners, claims of beachfront property owners, claims of beach

ENVIRONMENTAL POLLUTION CLAIMS SERVICE

users, claims of volunteer laborers, etc. In handling these types of claims, one must consider "masa psychology" in the sense that what you do for one person may well set the trend for what you must do thereafter for all others.

During our involvement with oil spills/ environmental pollution occurrences, we frequently have been utilized as a coordinator in regards to coordinating the activities of cleanup, claims, public relations and legal. All of these elements must be closely coordinated rather than each going their separate way.

Because of the political and economic impacts of oil spills, only the most experienced adjusting personnel should be involved. One reason is that improper handling of an oil spill could lead to a Class Action which otherwise might have been avoided.

If you are confronted in the future with a major or minor environmental pollution occurrence, please call us and we will promptly, adequately and economically take care of your environmental pollution claims problems.

Very truly yours,

CRAWFORD AND COMPANY

Ron DeNoville, General Manager
Environmental Pollution Claims Division

REFERENCES1. INDUSTRY

1. Ed Kettel, Assistant Treasurer, Atlantic-Richfield
2. Bill Rowland, President, Petroleum Casualty (Exxon)
3. Jim McCullough, Insurance Risk Manager, Union Oil of California
4. Tom Lister, Insurance Manager and Frank Jose, Assistant Insurance Manager, Standard Oil of California
5. Tom Douglass, Assistant Treasurer, Standard Oil of Ohio
6. Marty Flink, Jr., Insurance Manager, Standard Oil of Indiana
7. Lou Haxby, Manager, Environmental Conservation Department, Shell Oil Company
8. Bob Stine, Insurance Manager, Phillips Petroleum
9. John Godfrey, General Attorney-Claims, Missouri Pacific Railroad
10. Charles Johnson, Assistant Treasurer, Cities Service Company
11. Russ Madigan, Insurance Manager, Champlin Petroleum
12. Charles Morgan, Treasurer, Marathon Oil Corporation
13. A. Gordon Hanau, Insurance Manager, Consolidated Natural Gas & Service Company
14. George Yaneff, President, Oil Insurance Limited
15. Charles Niederer, Insurance Manager, Ocean Drilling & Exploration Company
16. Joseph Herrera, Manager Insurance and claims, States-Steamship Company
17. Dr. Jack Gould, Secretary, Committee on Environmental Affairs, American Petroleum Institute
18. Ron Massey, Insurance Manager and Bob Fern, Assistant Environmental Protection Coordinator, Imperial Oil Limited
19. Hank Wright, Western Oil & Gas Association
20. Charles Bailey, Insurance Manager and Vice President Tenneco, Inc.

21. Bob Kreiling, Insurance Manager, Texaco, Inc.
22. W. Hough, Insurance Manager, Bethlehem Steel
23. Other Insurance and Risk Managers of other oil companies

II. ATTORNEYS

1. Tony Brown and Dennis Bromley of Pillsbury, Madison & Sutro of San Francisco (1971 San Francisco Class Action Spill)
2. Allen Baillie of Healy & Baillie of New York City (90 mile long oil spill on the St. Lawrence River on 6/23/76- Limitation of Liability Filed)
3. Tony McGee, House Council for Exxon Company, U.S.A., Houston (45 mile long St. Lawrence River Oil Spill of 4-15-74- Class Action avoided)
4. Richard Myer of McHugh, Heckman, Smith & Leonard of New York City (1971 St. Croix Island Class Action)
5. George Freehill of Freehill, Hogan & Maher of New York City
6. Peter Bernard of Macre, Montgomery, Hill & Cunningham of Vancouver, Canada

III. P & I CLUBS: (LONDON/BERMUDA)

1. Alex Hetherington, Managing Director, TOVALOF and President of International Tankers Indemnity Association
2. Charles Mawdsley, Charles Taylor and Company, London (Standard Steamship Owners Protection & Indemnity Association)
3. Rex Palmer, Thomas R. Miller & Son, London (U.K. Club)
4. Allen Maccoy, Thomas R. Miller & Son, Bermuda

IV. GOVERNMENT

1. Ken Biglane, Director, Oil & Special Materials Control Division, Environmental Protection Agency, Washington, D.C.
2. Charles Corbett, Captain, U.S. Coast Guard, Chief, Environmental Coordination Branch, Washington, D.C.
3. Michael Christensen, Office of Marine Environment & Systems, Marine Environmental Protection Division U.S. Coast Guard, Washington, D.C.
4. J. R. Kirkland, Captain, U.S. Coast Guard, Chief, Marine Environmental Protection Division
5. Al Bridgman, Jr., Attorney, Captain, U.S. Coast Guard, Washington, D.C.
6. James S. Matteson, National Oceanic and Atmospheric Administration, Washington, D. C.

MAJOR CO-ORDINATING SPEECHES

1. 1979 Oil Spill Conference (Internationsl) in Los Angeles, California (sponsored by: American Petroleum Institute; Environmental Protection Agency; United States Coast Guard) - 1979
2. The 5th Annual Oil Spill Conference, Orlando, Florida - 1978
3. The American Society for Testing and Materials Seminar on "Procedures for Measuring the Economic Value of Environmental Damages", New Orleans, Louisiana - 1978
4. The Pipe Line Insurance Managers Conference, Los Angeles, California - 1978
5. The Risk Insurance Managers Society (Oil Industry Session) in New York City - 1977
6. The American Society of Insurance Managers (Oil Industry Session) in Dallas, Texas - 1975
7. The Canadian National Oil Spill Committee in San Francisco - 1975
8. Texaco through their insurance representative, invited this writer to give a talk and participate at their on-scene Oil Spill Commander's Symposium at Beacon, New York. At this meeting, Texaco formed their National response teams to handle major Oil Spills - 1974
9. The Institute of Man and Science in New York at the United States Environmental Protection Agency Symposium - 1973
10. Oil Insurance Limited at a meeting in Jamaica - 1973
11. The American Petroleum Institute (Sub-Committee on Oil Spill Cleanup), in San Francisco - 1972
12. The American Petroleum Institute (Division of Insurance and Risk Managers), Miami, Florida - 1971



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
EDISON WATER QUALITY RESEARCH LABORATORY
EDISON, NEW JERSEY 08817

October 2, 1973

Mr. Ron DeNoville
General Manager
Oil Claims and Oil Services
1588A Callens Road
P.O. Drawer 1436
Ventura, California 93001

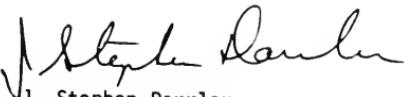
Dear Ron,

Just a note thanking you for your participation in last week's conference on the Assessment of Social Impacts of Oil Spills.

We here at the Edison Water Quality Research Laboratory feel that your contributions to the conference were very pertinent and cause us to realize the insight and value that hard experience can lend to such a symposium.

I hope that you benefited from the conference as much as we learned from your involvement. Again, thank you.

Sincerely yours,


J. Stephen Dorrler
Chief, Oil Spills Branch

AMERICAN PETROLEUM
1801 K STREET, NORTHWEST



INSTITUTE
WASHINGTON, D.C. 20006

Committee on Environmental Affairs
DR. J. R. GOULD

(202) 833-5762

November 1, 1972

Mr. Ron DeNoville, General Manager
Crawford and Company
1688A Callens Road
P.O. Drawer 1436
Ventura, California 93001

Dear Mr. DeNoville:

On behalf of the API Subcommittee on Oil Spills Prevention and Cleanup, I wish to thank you for appearing as our guest speaker at our last meeting on October 24. Both the subject matter of your talk and the presentation itself were excellent. You have given us some valuable insight into the problems which should be anticipated in adjusting claims following oil spills, and plans which should be laid to avoid substantial pitfalls.

Sincerely,

A handwritten signature in black ink that reads "J. R. Gould".

JRG:fn
cc: L. P. Haxby

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NOV - 3 1972
CRAWFORD AND CO.

**DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD**

MAILING ADDRESS
U.S. COAST GUARD (C-WEP-4/73)
400 SEVENTH STREET SW
WASHINGTON, D.C. 20390
PHONE 202-426-9568

2 SEP 1975

Mr. Ron DeNoville
General Manager
Oil Claims and Oil Services
5740 Ralston Street
Suite 114
P. O. Box 5232
Ventura, California 93003

Dear Ron:

I am writing to thank you for coming to Washington to talk with us concerning oil spill claims adjusting. Your discussion was most enlightening. I'm sure I speak for the whole group when I say the information you provided gave us a clearer perspective concerning the Comprehensive Fund.

I will endeavor to keep you posted on the progress of the bill. I hope we can get together on your side for the next chat.

Sincerely,



G. H. BROWN, III
Lieutenant Commander, U. S. Coast Guard
Chief, Pollution Response Branch
By direction of the Commandant

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CRAWFORD AND CO.

PRESENTATION BY DEPUTY ATTORNEY GENERAL EDWIN J. DUBIEL
TO SENATOR MUSKIE'S SUBCOMMITTEE ON OIL SPILL LITIGATION

San Francisco - June 29, 1979

May I introduce myself. I am Edwin J. Dubiel, Deputy Attorney General in the Office of the Attorney General of the State of California. I am the attorney who was responsible for the State of California's case concerning the Santa Barbara oil spill and am presently engaged in litigation concerning offshore oil development and regularly handle cases concerning oil spills and other hazardous substances which do damage to the property of the State of California.

The state property involved in most litigation concerning damages from oil spills and other hazardous substances consists of tidelands, state beaches, parks, university lands and all of the state-owned lands affected by a spill. There is personal property of the state, and fixtures, which are involved in oil spills that consist of boats, piers, various facilities concerning beaches and other properties of the state. In addition the state stands as trustees for the wildlife which includes the flora and fauna that may be affected by spills. It also is in a position of losing economically by way of taxes and loss of revenue caused by the shifting of the economic needs of the locality that is affected by the spill. It does have an interest, generally above its proprietary interest, based upon the requirement to

meet the needs of its citizens. These needs stem from direct monetary needs for such things as cleanup costs and additional regulatory demands upon its departments and agencies.

It has been our experience that most litigation involved in these oil spills require the review of existing statutes which were not primarily directed to the recovery for the damages from oil spills that actually do occur. Because of this fact, any type of spill interjects a great degree of uncertainty both to the entity that causes the spill and the persons, including the state, affected. Because of these uncertainties, it is most difficult to contemplate insurance costs, to determine actual costs of any endeavor and, in reality recover within a normal period of time damages that ensue.

The courts can only grant two types of relief, one being monetary and the other injunctive. We have found that the injunctive relief is of some value for future actions but has almost no value for past actions. In addition, the assessment of damages caused by any type of spill create the need for a massive amount of expertise and a tremendous cost for attorney fees, expenditure of court time and generally, a disruption of activities both by the state and by the other individuals affected by the spill including the oil companies.

To give you examples of some of the problems I have set forth an example in some of the categories which will highlight the difficulties that occur.

Land Values: The state, as owner of the tidelands, actually receives much of the residue oil for the indeterminate future in many instances. In that these lands are not bought and sold and are obstructed from view by many feet of water, it is almost impossible to assess the damage to these lands by a normal assessment process. We have used such methods as determining what Class A dumps are worth, trying to determine what the value of several inches to several feet of oil would be on grasslands or upon lands that are above water. The approach is to generally try to assess a value on these lands that would be representative of the damage that actually occurred. As noted this is extremely difficult and requires a tremendous amount of study which is costly both to the person affected by the spill and those who cause the spill.

Taxes and Other Regulatory Changes: It is very difficult to determine the cost of additional services that are required by the state because of a spill above those that are normally provided. These costs are not regularly set forth, not any more than the federal administrative costs that may be involved. Try to separate these costs from normal costs is almost impossible and sometimes arbitrary. This causes considerable difficulty even though it does tax the resources of the state to cope with the needs caused by the spill. A typical example is the ability to provide labor forces. In the Santa Barbara oil spill the state provided convict labor and additional police and other state personnel who also performed their regular duties as best

they could under the circumstances. There was also tax losses such as income tax, sales, tax, etc.

Personal Property: One portion of state personal property is beach sand which seems to be the first absorber of any oil spill on the ocean. In the Santa Barbara area, the sand volume has been declining over the years because of the concrete lining of the streams and is a diminishing asset. Whenever the sand is used to absorb oil and is hauled away, a tremendous loss has occurred. At the present time we have been assessing sand at approximately \$11.00/cubic yard which is much less than its actual value because it is almost irreplaceable. This type of innovative assessment has allowed us to recover for spills but does cause a considerable amount of controversy resulting in extended litigation.

Wildlife: It is most difficult to evaluate the cost of some wildlife. We have used various methods and have tried to arrive at a cost of each individual specimen of wildlife. After trying to arrive at this particular animal's worth, we then have the difficulty of ascertaining the particular volume of the loss. This requires the determination of the inventory prior to the spill and the determination of the inventory after the spill with some modifications as to causal effect of the difference of the inventory. Taking this figure and multiplying it by the value of the animal or flora or fauna loss we then try to arrive at a reasonable cost of the wildlife. It is necessary to try to determine the cost of the habitat and many of the other

ancillary costs involved including recreational losses that may be caused by the loss of the particular animal. As noted, this takes considerable time, effort and expertise and is extremely costly. In some instances the proof is more costly on a small spill than the cost of replacement.

Cost of Cleanup: As in most states, the State of California will assume, under its laws, the cost of cleanup if they are unable to secure cleanup by the responsible party. This has not been a costly matter at this time but as spills continue and as hazardous substances are uncovered, it presents a possible greater cost in the future. Because of this enormous cost it is questionable whether our present system of reimbursement is sufficient to create a revolving fund of a sufficient amount to cover the liabilities that may be assessed.

A review of the above would indicate that one of the greatest problems is the need to go through the process of evaluation on each spill and repeat many of the processes on each spill that are very costly. A system wherein an established method can be adopted with a method of recovery standardized, and set forth, would assist the persons who cause the spills and those that are damaged by the spills. It would provide a certainty of the recovery and remove much of the adversary and litigated processes that consume time and monies that should be directed toward the rehabilitation of the damage that has been caused. It is therefore recommended that consideration be given to establish:

of the damage that has been caused. It is therefore recommended that consideration be given to establish:

- 1) A predetermined method that will provide for the reimbursement of damages;
- 2) A rapid determination of the liability of the polluter and assessment of the cleanup costs be made as quickly as feasible;
- 3) A pre-assessment against those who handle the substances involved on a per unit charge which would in effect create an insurance fund to be drawn upon for the payment of damages that ensue.

Thank you very much for your consideration in this matter. The California Attorney General's Office will continue to assist with our experience in this matter as we have in the past.

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Exhibit 1

Tabulation of Species and Value
 of Birds effected by Santa
 Barbara Oil Spill

<u>Species</u>	<u>Value Per Bird</u>	<u>Total No. of Birds</u>	<u>Total Damage Value</u>
Grebes	\$ 17.56	2,020	\$ 35,471
Loons	46.25	401	22,245
Scoter	10.16	356	6,465
Cormorants	17.56	536	9,412
Murres	19.25	127	2,445
Ducks	19.10	62	1,184
Gulls	17.56	111	1,949
Mergansers	18.16	21	381
Misc.	<u>21.70</u>	<u>72</u>	<u>1,562</u>
Total		3,186	\$ 81,117

Species	Common Name	Estimated Value
Phylum PORIFERA	Sponges	
<i>Mycalia macginitiae</i>	Yellow sponge	\$2.50 per colony
<i>Verongia thiona</i>	Sulphur sponge	2.50 per colony
<i>Xestissofibula vanilla</i>	Vanilla sponge	2.50 per colony
<i>Plocamia karykina</i>	Red sponge	2.50 per colony
<i>Haliclona permollis</i>	Purple sponge	2.50 per colony
<i>Halichondria panicea</i>	Crumb-of-bread sponge	2.50 per colony
<i>Tetilla mutabilis</i>	Free-living sponge	2.50 per colony
<i>Lissodendoryx firma</i>	Skunk sponge	2.50 per colony
<i>Spheciropsysia confocderata</i>	Pacific Loggerhead sponge	2.50 per colony
<i>Rhabdodermella nuttingi</i>	Urn sponge	2.50 per colony
<i>Tethya aurantia</i>	Orange sponge	2.50 per colony
Phylum COELENTERATA	Jellyfishes	
Hydrozoa	Hydriids	
<i>Eudendrium californicum</i>	Brown Bushy Hydroid	2.50 per colony
<i>Corymorphia palma</i>	Solitary hydroid	2.50 per colony
<i>Tubularia crocea</i>	Oaten-pipe hydroid	2.50 per colony
<i>Clytia bakeri</i>	Clam hydroid	2.50 per colony
<i>Obelia dichotoma</i>	Branched obelia	2.50 per colony
<i>Abietinaria greenei</i>	Fern hydroid	2.50 per colony
<i>Aglaophenia struthionides</i>	Ostrich-plume hydroid	2.50 per colony
<i>Plumularia setaceae</i>	Glassy-plume hydroid	2.50 per colony
<i>Velella velella</i>	Purple sailing jellyfish	.25 each
Scyphozoa	True Jellyfish	
<i>Pelagia noctiluca</i>	Purple-striped jellyfish	2.00 each

Species	Common Name	Estimated Value
Phylum COELENTERATA		
Anthozos	Sea anemones	
<i>Renilla kollikeri</i>	Sea Pansy	\$1.00 each
<i>Stylatula elongata</i>	Slender sea pen	1.00 each
<i>Cerianthus aesturi</i>	Tube-building anemone	1.00 each
<i>Anthopleura xanthogrammica</i>	Solitary green anemone	.50 each
<i>Anthopleura elegantissima</i>	Aggregate anemone	2.50 per colony
<i>Corynactis californica</i>	Pink anemone	2.50 per colony
<i>Astrangia lajollaensis</i>	Solitary coral	2.50 per colony
Phylum CTENOPHORA		
<i>Pleurobrachia bachei</i>	COMB JELLIES	
	Sea gooseberry	2.00 each
Phylum PLATYHELMINTHES		
Flatworms		
<i>Leptoplana acticola</i>	Common flatworm	.50 each
<i>Thysanozoon sp.</i>	Fuzzy flatworm	1.00 each
Phylum NEMERTEA		
Proboscis worms or ribbon worms		
<i>Procephalothrix major</i>	Pink nemertean	2.50 each
<i>Lineus vegetus</i>	Banded nemertean	2.50 each
<i>Cerebratulus californiensis</i>	Fragile nemertean	2.50 each
<i>Emplectonema gracile</i>	Green nemertean	2.50 each
Phylum SIPUNCULOIDEA		
Peanut worms		
<i>Sipunculus nudus</i>	White peanut worm	1.00 each
<i>Dendrostoma pyroides</i>	Tan peanut worm	1.00 each
Phylum ECHIUROIDEA		
Echiuroid worms		
<i>Urechis caupo</i>	Innkeeper	2.50 each
Phylum BRACHIOPODA		
Lampshells		
<i>Glottidium albida</i>	Tongue lampshell	2.50 each

Species	Common Name	Estimated Value
Phylum BRACHIOPODA cont'd.	Lampshells	
Terebratalia transversa	Lampshell	\$ 2.50 each
Laqueus californicus	Lampshell	2.50 each
Phylum ANELIDA	Annelid worms	
Halosydnia johnsoni	Scale worm	.25 each
Neanthes succinea	Pileworm	.25 each
Nereis virens	Worm	.50 each
Nereis vexillosa	Clam worm	.50 each
Glycera dibranchiata	Bloodworm	.25 each
Chaetopterus variopedatus	Parchment tube worm	.20 each
Euzonus mucronata	Red worm	.25 each
Arenicola cristata	Lugworm	.25 each
Phragmatopoma californica <i>See Phragmatopoma californica</i>	Sand-castle worm	.20 each
Phylum BRYOZOA	Endoproct and Ectoproct moss animals	
Bugula californica	California moss animal	.10 per colony
Membranipora membranacea	Jackfrost bryozoan	.10 per colony
Rarentzia gracilis	Felt moss animal	.10 per colony
Alcyonidium mytili	Funny bryozoan	.10 per colony
Phylum MOLLUSCA	Molluscs	
Amphineura	Chitons or sea cradles	
Nuttallina californica	Troglodyte chiton	.50 each
Mopalia muscosa	Mossy chiton	.50 each
Stenoplax conspicua	Conspicuous chiton	.50 each
Lepidochitona hartwegii		.50 each
Lepidochitona raymondi	Raymond's chiton	.50 each
Ischnochiton magdalenensis	Gray chiton	.50 each

Species	Common Name	Estimated Value
Phylum MOLLUSCA cont'd.	Molluses	
Amphineura cont'd.	Chitons or sea cradles	
<i>Ischnochiton mertensii</i>	Red chiton	\$.50 each
<i>Ischnochiton cooperi</i>	Cooper's chiton	.50 each
<i>Ischnochiton regularis</i>	Regular chiton	.50 each
<i>Callistochiton palmulatus</i>	Palm chiton	.50 each
<i>Callistochiton crassicostatus</i>	Thick-ribbed chiton	.50 each
<i>Mopalia ciliata</i>	Hairy chiton	.50 each
<i>Placiphorella velata</i>	Veiled chiton	.50 each
<i>Katharina tunicata</i>	Black chiton	.50 each
<i>Cryptochiton stelleri</i>	Giant chiton	5.00 each
Cephalopoda	Octopus and squid	
<i>Argonauta pacifica</i>	Paper nautilus	10.00 each
<i>Octopus bimaculatus</i>	Two spotted octopus	1.00 each
<i>Octopus bimaculoides</i>	Mud-flat octopus	1.00 each
<i>Loligo opalescens</i>	Common squid	.03 each
Scaphopoda	Tusk shells	
<i>Dentalium neohexagonum</i>	Hexagonal tusk shell	3.00 each
<i>Dentalium semipolitum</i>	Polished tusk shell	3.00 each
Gastropoda		
<i>Acmaea asini</i>		.25 each
<i>Acmaea conus</i>		.25 each
<i>Acmaea digitalis</i>	Fingered limpet	.25 each
<i>Acmaea fenestrata</i>		.25 each
<i>Acmaea insessa</i>	Kelp limpet	.25 each
<i>Acmaea limatula</i>	File limpet	.25 each
<i>Acmaea mitra</i>		.25 each

Species	Common Name	Estimated Value
Phylum MOLLUSCA cont'd.	Molluscs	
Gastropoda cont'd.		
<i>Acmaea paleacea</i>		\$.25 each
<i>Acmaea pelta</i>	Shield limpet	.25 each
<i>Acmaea persona</i>		.25 each
<i>Acmaea scabra</i>	Rough limpet	.25 each
<i>Lottia gigantea</i>	Owl limpet	.25 each
<i>Haliotis corrugata</i>	Pink abalone	.67 each
<i>Haliotis cracherodi</i>	Black abalone	.25 each
<i>Haliotis fulgens</i>	Green abalone	.69 each
<i>Haliotis rufescens</i>	Red abalone	1.36 each
<i>Haliotis assimilis</i>	Threaded abalone	.25 each
<i>Haliotis sorenseni</i>	White abalone	.60 each
<i>Pissurella volcano</i>	Volcano limpet	.25 each
<i>Diodora aspera</i>		.25 each
<i>Lucapinella calomarginata</i>		.25 each
<i>Megathura crenulata</i>	Giant keyhole limpet	2.50 each
<i>Calliostoma tricolor</i>		.25 each
<i>Norrisia norrisi</i>	Smooth brown turban	.25 each
<i>Tegula aureotincta</i>	Gilded Turban shell	.25 each
<i>Tegula funebralis</i>	Black turban shell	.25 each
<i>Tegula gallina</i>	Speckled turban shell	.50 each
<i>Tegula ligulata</i>		.50 each
<i>Astraea undosa</i>	Wavy top shell	.50 each
<i>Epitonium tinctorum</i>		.50 each
<i>Opalia insculpta</i>		.50 each
<i>Littorina planaxis</i>	Flat-bottomed periwinkle	.50 each

Species	Common Name	Estimated Value
Phylum MOLLUSCA cont'd.	Molluscs	
Gastropoda cont'd.		
<i>Littorina scutulata</i>	Checkered periwinkle	\$.50 each
<i>Turritella cooperi</i>		.50 each
<i>Serpulorbis squamigerus</i>	Scaly tube snail	.50 each
<i>Cerithidea californica</i>	California horn shell	.50 each
<i>Hipponix antiquatus</i>	Ancient hoof shell	.50 each
<i>Janthina janthina</i>	Common violet sea snail	.50 each
<i>Crepidula onyx</i>	Onyx slipper shell	.50 each
<i>Epitonium tintillum</i>	White wentletrap	.50 each
<i>Crepidula nummaria</i>		.50 each
<i>Crepidula adunca</i>	Turban slipper shell	.50 each
<i>Crepidatella lingulata</i>		.50 each
<i>Erato columbella</i>	Dove shell	.50 each
<i>Crucibulum spinosum</i>	Cup-and-saucer shell	.50 each
<i>Neverita alta</i>		.50 each
<i>Neverita reclusiana</i>		.50 each
<i>Polinices reclusianus</i>	Refluz's moon shell	.50 each
<i>Polinices draconis</i>		.50 each
<i>Polinices lewisi</i>	Levis's moon shell	.50 each
<i>Cypraea (Zonaria) spadicea</i>	Chestnut cowry	.50 each
<i>Trivia (Pusula) californiana</i>	Little coffee-bean	.50 each
<i>Trivia (Pusula) solandri</i>	Large coffee-bean	.50 each
<i>Bursa californica</i>		.50 each
<i>Ceratostoma nuttalli</i>	Nuttall's hornmouth	.50 each
<i>Forreria belcheri</i>		.50 each

Species	Common Name	Estimated Value
Phylum MOLLUSCA cont'd.	Molluscs	
Gastropoda cont'd.		
<i>Shaskyus festvus</i>	Feative murx	\$.50 each
<i>Maxwellia gemma</i>	Gem murex	.50 each
<i>Trophonopsis triangulata</i>	Three-cornered trophon	.50 each
<i>Ocenebra circumtexta</i>		.50 each
<i>Ocenebra gracillima</i>		.50 each
<i>Ocenebra poulsoni</i>	Poulson's dwarf triton	.50 each
<i>Pteropurpura carpenteri</i>		.50 each
<i>Pteropurpura trialatus</i>		.50 each
<i>Acanthina paucilirata</i>	Checkered unicorn shell	.50 each
<i>Acanthina spirata</i>	Angular unicorn shell	.50 each
<i>Thais emarginata</i>	Rock thais	.50 each
<i>Kelletia kelleti</i>	Kellet's Whelk	.50 each
<i>Macron lividus</i>	Livid macron	.50 each
<i>Amphissa versicolor</i>		.50 each
<i>Nassarius fossatus</i>	Channeled dog whelk	.50 each
<i>Nassarius mendicus</i>		.50 each
<i>Nassarius perpinguis</i>		.50 each
<i>Nassarius tegula</i>		.50 each
<i>Mitra idae</i>	Ida's mitre shell	.50 each
<i>Olivella baetica</i>	Olive shell	.50 each
<i>Olivella biplicata</i>	Purple olive shell	.50 each
<i>Conus (Chelyconus) californicus</i>	California cone shell	.50 each
<i>Orphiodermella ophioderma</i>		.50 each
<i>Pseudomelatoma moesta</i>		.50 each

Species	Common Name	Estimated Value
Phylum MOLLUSCA cont'd.	Molluscs	
Gastropoda cont'd.		
<i>Bulla gouldiana</i>	Gould's bubble shell	\$1.00 each
<i>Haminoea virescens</i>	White bubble shell	1.00 each
<i>Navanax inermis</i>	Bay sea hare	1.00 each
<i>Acteon punctocoelata</i>		1.00 each
<i>Aplysia californica</i>	Sea hare	1.00 each
<i>Aplysia vaccaria</i>	Black sea hare	1.00 each
<i>Anisodoris nobilis</i>	Lemon nudibranch	1.00 each
<i>Diaulula sandiegensis</i>	San Diego nudibranch	1.00 each
<i>Polycera atra</i>		1.00 each
<i>Hopkinsia rosacea</i>	Rose nudibranch	1.00 each
<i>Flabellina iodinea</i>	Purple Fan nudibranch	1.00 each
<i>Hermissenda crassicornis</i>	Hermissenda	1.00 each
<i>Melanopus olivaceus</i>	Olive nudibranch	1.00 each
<i>Glossodoris californiensis</i>	Blue and Gold nudibranch	1.00 each
<i>Glossodoris macfarlandi</i>	Orchid nudibranch	1.00 each
<i>Rostanga pulchra</i>	Red sponge nudibranchs	1.00 each
Pelecypoda		
<i>Ostrea lurida</i> Carpenter 1864	Native oyster	.30 each
<i>Hinnites multirugosus</i> Gale 1928	Rock Scallop	.40 each
<i>Leptopecten latiauratus</i> (Conrad)	Kelp scallop	.40 each
<i>Plagioctenium circularis</i> <i>aequisulaatum</i> (Carpenter 1865)	Speckled scallop	.40 each
<i>Pecten diegensis</i> Dall 1898	San Diego Scallop	.40 each
<i>Podoesmus cepio</i> (Gray 1849)	Abalone jingle	.40 each
<i>Anomia peruviana</i> d Orbigny 1837	Pearly jingle	.40 each

Species	Common Name	Estimated Value
Phylum MOLLUSCA cont'd.	Mollusca	
Pelecypoda cont'd.		
<i>Volsella capox</i> (Conrad 1837)	Fat Horse mussel	\$.30 each
<i>Volaella recta</i> (Conrad 1837)	Straigh horse mussel	.30 each
<i>Volsella flabellata</i> (Gould 1850)	Giant horse mussel	.30 each
<i>Botula falcata</i> (Gould 1851)	Pea-Pod borer	.30 each
<i>Mytilus californianus</i> Conrad 1837	California sea-mussel	.30 each
<i>Mytilus edulis</i> Linnaeus 1758	Bay Mussel	.30 each
<i>Modiolus modiolus</i> Linnaeus	Great horse mussel	.30 each
<i>Lithophaga plumula</i> kelsey hertlein and Strong 1946	Rockboring mussel	.30 each
<i>Septifer bifurcatus</i> (Conrad)	Branch-ribbed mussel	.30 each
<i>Trachycardium quadragenarium</i> (Conrad 1837)	Spiny cockle	.30 each
<i>Lithophaga plumula</i> (Hanley)	Date mussel	.30 each
<i>Clinocardium nuttalli</i> (Conrad 1937)	Basket Cockle	.30 each
<i>Chama pellucida</i> Sowerby 1835	Agate chama	.30 each
<i>Glaes carpenteri</i> Lamy	Little Heart shell	.30 each
<i>Pseudochama exogyra</i> (Conrad 1837)	California reversed chama	.30 each
<i>Cardita ventricosa</i> Gould	Stout heart shell	.30 each
<i>Tevela stultorum</i> (Mawe 1823)	Pismo clam	.30 each
<i>Laevicardium substriatum</i>	Common Eggshell Cockle	.30 each
<i>Amiantis callosa</i>	White amiantis	.30 each
<i>Saxidomus nuttalli</i>	Common Washington clam	.30 each
<i>Prototthara tenerrima</i>	Thin Shelled littleneck	.30 each

Species	Common Name	Estimated Value
Phylum MOLLUSCA cont'd.	Mollusca	
Pelecypoda cont'd.		
<i>Protothaca staminea</i>	Common littleneck	\$.30 each
<i>Protothaca laciniata</i>	Rough-sided littleneck	.30 each
<i>Chione fluctifraga</i>	Smooth chione	.30 each
<i>Chione undatella</i>	Wavy chione	.30 each
<i>Chione californiensis</i>	Banded chione	.30 each
<i>Apomyctis biangulata</i>	Yellow apomyctis	.30 each
<i>Tellina bodegaensis</i>	Bodega tellen	.30 each
<i>Macoma nasuta</i>	Bent-nose clam	.30 each
<i>Macoma secta</i>	White sand clam	.30 each
<i>Solen rosaceus</i>	Rosy razor clam	.30 each
<i>Solen sicarius</i>	Sickle razor clam	.30 each
<i>Tegelus californianus</i>	California jackknife clam	.30 each
<i>Gari edentula</i>	Deep water gari	.30 each
<i>Gari californica</i>	Sunset clam	.30 each
<i>Sanguinolaria nuttalli</i>	Purple clam	.30 each
<i>Donax gouldi</i>	Bean clam	.30 each
<i>Donax californicus</i>	Wedge clam	.30 each
<i>Mactra californica</i>	California mactra	.30 each
<i>Spisula catilliformis</i>	Narrow dish clam	.30 each
<i>Spisula hemphilli</i>	Hemphill's dish clam	.30 each
<i>Schizothaerus nuttalli</i>	Caper	.30 each
<i>Platyodon cancellatus</i>	Checked boreo	.30 each
<i>Panope generosa</i>	Geoduck	.30 each
<i>Pholadidae ovoidea</i>	Wart-necked piddock	.30 each

Species	Common Name	Estimated Value
Phylum MOLLUSCA cont'd.	Molluscs	
Pelecypoda cont'd.		
Barnea pacifica	Mud Piddock	\$.30 each
Zirfaea pilsbryi	Rough piddock	.30 each
Parapholas californica	Scale-sided piddock	.30 each
Penitella penita	Flap-tipped piddock	.30 each
Phylum ARTHROPODA		
Pycnogonida	Sea spiders	
Ammothella bi-unguiculata	Sea spider	.50 each
Anoplodactylus erectus	Sea spider	.50 each
Pycnogonum stearnsi	Anemone sea spider	.50 each
Crustacea		
Tigriopus californicus	Tide pool copepod	.20 each
Balanus tintinnabulum	Pink Barnacle	.30 each
Balanus glandula	White Buckshot barnacle	.30 each
Chthamalus fissus	Brown Buckshot barnacle	.30 each
Tetraclita squamosa	Thatched barnacle	.30 each
Pollicipes polymerus	Goose barnacle	.30 each
Lepas anatifera	Ship goose barnacle	.30 each
Lepas fascicularis	Floating Goose barnacle	.30 each
Heterosaccus californicus	Parasitic barnacle	.30 each
Cirolana harfordi	Swimming isopod	.70 each
Colidotea rostrata	Sea urchin isopod	.70 each
Idothea (Pentidotea) resecata	Kelp Isopod	.70 each
Idothea (Idothea) urotoma	Flat-tailed isopod	.70 each
Ligia occidentalis	Rock louse	.50 each
Caprella equilibra Say	Kelp skeleton shrimp	.70 each

Species	Common Name	Estimated Value
Phylum ARTHROPODA cont'd.		
Crustacea cont'd.		
<i>Elasmopus rapax</i>	Mussel hopper	\$.20 each
<i>Orchestoidea corniculata</i>	Large beach hopper	.20 each
<i>Orchestoidea californiana</i>	California beach hopper	.20 each
<i>Betaeus harfordi</i>	Abalone shrimp	.10 each
<i>Eusicyonia ingentis</i>	Ridgeback prawn	.25 each
<i>Crangon dentipes</i>	Snapping shrimp	.15 each
<i>Hippolytsma californica</i>	Striped tide pool shrimp	.10 each
<i>Spirontocaris picta</i>	Broken-back shrimp	.15 each
<i>Crago franciscorum</i>	Bay shrimp	.15 each
<i>Crago nigricauda</i>	Shrimp	.15 each
<i>Panulirus interruptus</i>	California Spiny lobster	3.60 each
<i>Upogebia pugettensis</i>	Blue mud shrimp	.20 each
<i>Callianassa californiensis</i>	California Ghost shrimp	.25 each
<i>Pagurus hirsutiusculus</i>	Hairy hermit crab	.20 each
<i>Pleuroncodes planipes</i>	Red swimming crab	.20 each
<i>Emerita analoga</i>	Common sand crab	.20 each
<i>Blepharipoda occidentalis</i>	Giant sand crab	.20 each
<i>Lepidopoda myops</i>	White sand crab	.20 each
<i>Pachycheles rudis</i>	Thick-clawed porcelain crab	.25 each
<i>Petrolisthes cinctipes</i>	Flat Porcelain crab	.25 each
<i>heterocrypta occidentalis</i>	Elbow crab	.25 each
<i>Pugettia producta</i>	Shield-backed kelp crab	.25 each
<i>Taliepus nuttalli</i>	Globose kelp crab	.25 each
<i>Loxorhynchus crispatus</i>	Masking crab	.50 each

Species	Common Name	Estimated Value
Phylum ARTHROPODA cont'd.		
Crustacea cont'd.		
<i>Loxorhynchus grandis</i>	Spider crab	\$.50 each
<i>Cancer productus</i>	Red rock crab	.75 each
<i>Cancer antennarius</i>	Spot-bellied rock crab	.75 each
<i>Cancer magister</i>	Market crab	.75 each
<i>Cancer anthonyi</i>	Rock crab	.75 each
<i>Portunus xantuii</i>	Swimming crab	.25 each
<i>Lophopanopeus heathii</i>	Black-fingered crab	.25 each
<i>Paraxanthias taylori</i>	Lumpy crab	.25 each
<i>Speocarcinus californiensis</i>	Burrowing crab	.25 each
<i>Fabia subquadrata</i>	Pea crab	.25 each
<i>Pachygrapsus crassipes</i>	Striped shore crab	.25 each
<i>Hemigrapsus nudus</i>	Purple shore crab	.25 each
<i>Hemigrapsus oregonensis</i>	Shore crab	.25 each
<i>Uca crenulata</i>	Fiddler crab	.25 each
Phylum ECHINODERMATA		
Spiny-skinned animals		
Asterozoa		
<i>Astropecten brasiliensis</i> armatus	Shallow-water sand star	.25 each
<i>Linckia columbiae</i>	Variable sea star	.25 each
<i>Patiria miniata</i>	Webbed sea star	.25 each
<i>Astrometis sertulifera</i> Xantus	Soft sea star	.25 each
<i>Pisaster giganteus</i>	Knobby sea star	.25 each
<i>Pisaster ochraceus</i>	Ochre sea star	.25 each
<i>Ophionereis annulata</i>	Banded brittle star	.25 each
<i>Ophiothrix spiculata</i>	Spiny brittle star	.25 each

Species	Common Name	Estimated Value
Phylum ECHINODERMATA cont'd.	Spiny-skinned animals	
Asterozoa cont'd.		
<i>Ceramaster leptoceramus</i>	Pentagonal sea star	\$.25 each
<i>Mediaster aequalis</i>		.25 each
<i>Astropecten armatus</i>	Leather star	.25 each
<i>Astropecten californicus</i>	California sand star	.25 each
<i>Astropecten ornatissimus</i>	Ornate sand star	.25 each
<i>Luidia foliolata</i>		.25 each
<i>Ophioderma panamensis</i>	Snakeskin brittle star	.25 each
<i>Ophiura lukkeni</i>		.25 each
<i>Ophioplucus esmarki</i>		.25 each
<i>Ophiopteris papillosa</i>		.25 each
Echinoidea	Sea urchins and sand dollars	
<i>Strongylocentrotus purpureus</i>	Purple sea urchin	.35 each
<i>Strongylocentrotus franciscanus</i>	Red sea urchin	.35 each
<i>Dendraster excentricus</i>	Sand Dollar	.25 each
Holothuroidea	Sea cucumbers	
<i>Stichopus parvimensis</i>	Common Sea cucumber	.45 each
<i>Molpadias arenicola</i>	Sweet potato sea cucumber	.45 each
Phylum TUNICATA	Sea squirts and salps	
<i>Ciona intestinalis</i>	Yellow-green sea squirt	1.25
<i>Styela montereyensis</i>	Long-stalked sea squirt	1.25
<i>Botrylloides diegensis</i>	Encrusting compound ascidian	1.25
<i>Euherdmania claviformis</i>	Club-shaped ascidian	1.25
<i>Thetys vagina</i>	Common salp	1.25

<u>Species</u>	<u>Estimated Value</u>
PLANKTON	
Phytoplankton	\$50.00 per liter (1.057 quarts)
Zooplankton	
Eggs	no criteria for individual values
Fish	
Crustacean	
Holothuroid	
Echinoid	
Ophiuroid	
Asteroid	
Brachiopod	
Cyphonautes	
Phoronid	
Cirripede	
Polychaete	
Gastropod	
Pelecypod	
Euphausids	
Larvaceans	
Salps	
Doliolids	
Heteropods	
Pteropods	
Squid	
Isopods	
Amphipods	
Euphausids	
Mysids	
Copepods	
Ostracods	
Cladocerans	
Annelids	
Chaetognaths	
Ctenophores	
Coelenterates	

	Estimated Value
<u>Polychaeta</u>	
<i>Nothria iridescens</i>	\$.25
<i>Nothria stigmatis</i>	.25
<i>Notocirrus californiensis</i>	.25
<i>Onuphis eremita</i>	.25
<i>Onuphis litoralis</i>	.25
<i>Onuphis microcephala</i>	.25
<i>Onuphis nebulosa</i>	.25
<i>Onuphis parva</i>	.25
<i>Onuphis vexillaria</i>	.25
<i>Panthalis pacifica</i>	.25
<i>Pectinaria californiensis</i>	.25
<i>Platynereis bicanaliculata</i>	.25
<i>Poecilochaetus johnsoni</i>	.25
<i>Polyodontes panamensis</i>	.25
<i>Rhamphobrachium longisetosum</i>	.25
<i>Sternaspis fossor</i>	.25

Species	Estimated Value	Species	Estimated Value
Phylum ANELIDS		Worms	
<u>Polychaeta</u>			
<i>Aglaophamus dicirris</i>	\$.25 each	<i>Lumbrineris bassi</i>	\$.25 each
<i>Arabella geniculata</i>	.25 each	<i>Lumbrineris bicirrata</i>	.25 each
<i>Arabeaal iricolor</i>	.25 each	<i>Lumbrineris californiensis</i>	.25 each
<i>Arabella pectinata</i>	.25 each	<i>Limbrineris cruzensis</i>	.25 each
<i>Arabella semimaculata</i>	.25 each	<i>Lumbrineris index</i>	.25 each
<i>Ceratocephale crosslandi</i>	<i>american</i>	<i>Lumbrineris lagunae</i>	.25 each
	.25 each		
<i>Chloeia entypa</i>	.25 each	<i>Lumbrineris limicola</i>	.25 each
<i>Chloeia pinnata</i>	.25 each	<i>Lumbrineris minima</i>	.25 each
<i>Diopatra neotridens</i>	.25 each	<i>Lumbrineris pallida</i>	.25 each
<i>Diopatra ornata</i>	.25 each	<i>Lumbrineris cfr. sarsi</i>	.25 each
<i>Diopatra tridentata</i>	.25 each	<i>Lumbrineris tetraura</i>	.25 each
<i>Dorvillea articulata</i>	.25 each	<i>Lumbrineris cfr. zonata</i>	.25 each
<i>Driloneis falcata</i>	.25 each	<i>Marphysa conferta</i>	.25 each
<i>Driloneis filum</i>	.25 each	<i>Marphysa disjuncta</i>	.25 each
<i>Driloneis longa</i>	.25 each	<i>Marphysa stylobranchiata</i>	.25 each
<i>Driloneis nuda</i>	.25 each	<i>Nephtys assignis</i>	.25 each
<i>Eunice americana</i>	.25 each	<i>Nephtys caecoides</i>	.25 each
<i>Glycera americana</i>	.25 each	<i>Nephtys californiensis</i>	.25 each
<i>Glycera branchiopoda</i>	.25 each	<i>Nephtys ferruginea</i>	.25 each
<i>Glycera capitata</i>	.25 each	<i>Nephtys glabra</i>	.25 each
<i>Glycera convoluta</i>	.25 each	<i>Neanthes sp. 1</i>	.25 each
<i>Glycera dibranchiata</i>	.25 each	<i>Neanthes sp. 2</i>	.25 each
<i>Glycera robusta</i>	.25 each	<i>Nereis latescens</i>	.50 each
<i>Glycera tenuis</i>	.25 each	<i>Nereis procera</i>	.50 each
<i>Glycera tesselata</i>	.25 each	<i>Nereis sp. 1</i>	.50 each
<i>Hyalinoecia juvenalis</i>	.25 each	<i>Ninow gemmea</i>	.25 each

Species	Common Name	Estimated Value Per Animal
<u>Fishes</u>		
<i>Branchiostoma californiense</i>	California lancelet	\$.25
<i>Polistotrema deani</i>	Black hagfish	1.00
<i>Polistotrema stouti</i>	Pacific hagfish	1.00
<i>Lampetra tridentata</i>	Pacific lamprey	1.00
<i>Hexanchus griseum</i>	Sixgill shark	100.00
<i>Notorynchus</i>	Sevengill shark	100.00
<i>Chlamydoselachus anguineum</i>	Frill shark	500.00
<i>Heterodontus francisci</i>	Horn shark	1.00
<i>Alopias vulpinus</i>	Tresher shark	26.00
<i>Carcharodon carcharias</i>	Great white shark	12.00
<i>Cetorhinus maximus</i>	Basking shark	133.00
<i>Isurus glaucus</i>	Bonito shark	10.00
<i>Lamna ditropis</i>	Salmon shark	12.00
<i>Apristurus brunneus</i>	Brown cat shark	1.00
<i>Cephaloscyllium uter</i>	Swell shark	2.50
<i>Parmaturus xaniurus</i>	Filetail cat shark	1.00
<i>Carcharhinus azureus</i>	Roundnose shark	1.00
<i>Galeorhinus zyopterus</i>	Soupfin shark	6.70
<i>Mustelus californicus</i>	Gray smoothhound	2.50
<i>Prionace glauca</i>	Blue shark	7.25
<i>Triakis semifasciata</i>	Brown smoothhound	2.50

<i>Triakis semifasciata</i>	Leopard shark	\$ 1.25
<i>Sphyraena zygaena</i>	Smooth hammerhead	12.25
<i>Squalus acanthias</i>	Spiny dogfish	4.90
<i>Squatina californica</i>	Pacific angel shark	1.25
<i>Platyrrhinoidis triseriata</i>	Thornback	1.00
<i>Rhinobatos productus</i>	Shovelnose guitarfish	1.00
<i>Torpedo californica</i>	Pacific electric ray	35.00
<i>Bréviraja kincaidi</i>	Sandpaper skate	1 5 0
<i>Raja binoculata</i>	Big skate	1.50
<i>Raja inornata</i>	California skate	1.50
<i>Raja rhina</i>	Longnose skate	1.50
<i>Raja stellulata</i>	Starry skate	1.50
<i>Raja trachura</i>	Roughtail skate	1.00
<i>Dasyatis dipterurus</i>	Diamond stingray	1.00
<i>Gymnura marmorata</i>	California butterfly ray	1.00
<i>Urolophus halleri</i>	Round stingray	1.00
<i>Myliobatis californicus</i>	Bat ray	1.50
<i>Mobula japonica</i>	Spinetail mobula	1.50
<i>Hydrolagus colliei</i>	Ratfish	4.00
<i>Acipenser medirostris</i>	Green sturgeon	5.75
<i>Acipenser transmontanus</i>	White sturgeon	5.75
<i>Albula vulpes</i>	Bonefish	1.00
<i>Alosa sapidissima</i>	American shad	.10
<i>Clupea pallasi</i>	Pacific herring	0.047

<i>Sardinops caeruleus</i>	Pacific sardine	\$.069
<i>Engraulis mordax</i>	Northern anchovy	.00112
<i>Oncorhynchus kisutch</i>	Coho salmon	8.65
<i>Oncorhynchus tshawytscha</i>	King salmon	17.00
<i>Salmo gairdneri gairdneri</i>	Steelhead rainbow trout	7.90
<i>Allosmerus elongatus</i>	Whitebait smelt	0.312
<i>Spirinchus starksii</i>	Night smelt	.0274
<i>Argentina sialis</i>	Pacific argentine	1.00
<i>Bathylagus pacificus</i>	Pacific blacksmelt	1.00
<i>Bathylagus wesethi</i>	Southern blacksmelt	1.00
<i>Bathylagus stilbius</i>	California smoothtongue	1.00
<i>Argyropelecus lychnus</i>	Silver hatchetfish	1.00
<i>Cyclothone signata</i>	Showy bristlemouth	1.00
<i>Ichthyococcus irregularis</i>	Bulldog lightfish	1.00
<i>Bathophilus indicus</i>	Indian dragonfish	1.00
<i>Tactostoma macroups</i>	Longfin dragonfish	1.00
<i>Aristostomias scintillans</i>	Shiny loosejaw	1.00
<i>Chauliodus macouni</i>	Pacific viperfish	1.00
<i>Idiacanthus antrostomus</i>	Pacific blackdragon	1.00
<i>Synodus lucioceps</i>	California lizardfish	1.00
<i>Alepisaurus richardsoni</i>	Pacific lancetfish	5.00
<i>Diaphus theta</i>	California headlightfish	1.00
<i>Diogenichthys atlanticus</i>	Longfin lanternfish	1.00
<i>Protomyctophum crockeri</i>		1.00

<i>Lampanyctus leucopsarus</i>	Northern lampfish	\$ 1.00
<i>Lampanyctus mexicanus</i>	Mexican lampfish	1.00
<i>Lampanyctus regalis</i>	Pinpoint lampfish	1.00
<i>Lampanyctus ritteri</i>	Broadfin lampfish	1.00
<i>Ceratoscopelus townsendi</i>	Dogtooth lampfish	1.00
<i>Symbolophorus californiense</i>	California lanternfish	1.00
<i>Tarletonbeani crenularis</i>	Blue lanternfish	1.00
<i>Gymnothorax mordax</i>	California moray	1.00
<i>Nemichthys scolopaceus</i>	Common snipe--eel	1.00
<i>Gnathophis catalinensis</i>	Catalina conger	1.00
<i>Strongylura exilis</i>	California needlefish	1.00
<i>Cololabis saira</i>	Pacific saury	0.0073
<i>Cypselurus californicus</i>	California flyingfish	1.00
<i>Fodiator acutus</i>	Sharpchin flyingfish	1.00
<i>Merluccius productus</i>	Pacific hake	.04
<i>Microgadus proximus</i>	Pacific tomcod	.05
<i>Nezumia stellidolepis</i>	California rattail	1.00
<i>Aulorhynchus flavidus</i>	Tube-snout	1.00
<i>Syngnathus californiensis</i>	Kelp piperfish	1.00
<i>Syngnathus griseolineatus</i>	Bay piperfish	1.00
<i>Lampris regius</i>	Opah	5.00
<i>Trachipterus altivelis</i>	King-of-the-salmon	10.00
<i>Paralabrax clathratus</i>	Kelp bass	1.00
<i>Paralabrax nebulifer</i>	Sand bass	1.00

<i>Stereolepis gigas</i>	Giant sea bass	\$ 22.90
<i>Pseudopriacanthus serrula</i>	Popeye catalufa	1.00
<i>Caulolatilus princeps</i>	Ocean whitefish	.26
<i>Seriola dorsalis</i>	California yellowtail	1.60
<i>Trachurus symmetricus</i>	Jack mackerel	.08
<i>Anisotremus davidsoni</i>	Sargo	.18
<i>Cynoscion nobilis</i>	White seabass	7.00
<i>Genyonemus lineatus</i>	White croaker	.05
<i>Menticirrhus undulatus</i>	California corbina	.03
<i>Roncador stearnsi</i>	Spotfin croaker	.09
<i>Seriphus politus</i>	Queenfish	.05
<i>Umbrina roncador</i>	Yellowfin croaker	.26
<i>Medialuna californiensis</i>	Halfmoon	.22
<i>Girella nigricans</i>	Opaleye	.16
<i>Hermosilla azurea</i>	Zevraperch	.16
<i>Pentaceros richardsoni</i>	Pelagic armorhead	.16
<i>Amphistichus argenteus</i>	Barred surfperch	.30
<i>Amphistichus koelzi</i>	Calico surfperch	.13
<i>Brachyistius frenatus</i>	Kelp perch	.16
<i>Cymatogaster aggregata</i>	Shiner perch	.02
<i>Cymatogaster gracilis</i>	Island perch	.02
<i>Embiotoca jacksoni</i>	Black perch	.13
<i>Embiotoca lateralis</i>	Striped seaperch	.20
<i>Hyperprosopon analis</i>	Spotfin surfperch	.16

<i>Hyperprosopon argenteum</i>	Walleye surfperch	\$.05
<i>Hyperprosopon sllipticum</i>	Silver surfperch	.02
<i>Hypsurus caryi</i>	Rainbow seaperch	.10
<i>Micrometrus aurora</i>	Reef perch	.02
<i>Micrometrus minimus</i>	^D warf perch	.02
<i>Phanerodon atripes</i>	Sharpnose seaperch	.02
<i>Phanerodon furcatus</i>	White seaperch	.18
<i>Rhacochilus toxotes</i>	Rubberlip perch	.33
<i>Rhacochilus vacca</i>	Pile perch	.20
<i>Zalembius rosaceus</i>	Pink seaperch ..	.02
<i>Chromis punctipinnis</i>	Blacksmith	.13
<i>Hypsypops rubicunda</i>	Garibaldi	1.00
<i>Halichoeres semicinctus</i>	Rock wrasse	1.00
<i>Oxyjulis californica</i>	Senorita	1.00
<i>Pimelometopon pulchrum</i>	California sheephead	1.70
<i>Sarda chiliensis</i>	Pacific bonito	.22
<i>Scomber diego</i>	Pacific mackerel	.10
<i>Scomberomorus concolor</i>	Monterey spanish mackerel	.12
<i>Thunnus alalunga</i>	Albacore	4.90
<i>Thunnus albacares</i>	Yellowfin tuna	5.40
<i>Thunnus thynnus</i>	Bluefin tuna	2.75
<i>Luvarus imperialis</i>	Louvar	50.00
<i>Xiphias gladius</i>	Swordfish ..	141.00
<i>Coryphopterus nicholsi</i>	Bluespot goby	1.00

<i>Eucyclogobius newberryi</i>	Tidewater goby	\$ 1.00
<i>Lepidogobius lepidus</i>	Bay goby	1.00
<i>Lythrypnus zebra</i>	Zebra goby	1.00
<i>Lethops connexens</i>	Halfblind goby	1.00
<i>Typhlogobius californiensis</i>	Blind goby	1.00
<i>Scorpaena guttata</i>	Sculpin	1.00
<i>Sebastodes alutus</i>	Pacific ocean perch	.07
<i>Sebastodes atrovirens</i>	Kelp rockfish	.11
<i>Sebastodes auriculatus</i>	Brown rockfish	.20
<i>Sebastodes aurora</i>	Aurora rockfish	.09
<i>Sebastodes babcocki</i>		.07
<i>Sebastodes carnatus</i>	Gopher rockfish	.52
<i>Sebastodes caurinus</i>	Copper rockfish	.15
<i>Sebastodes chlorostictus</i>	Greenspotted rockfish	.12
<i>Sebastodes chrysomelas</i>	Black-and-yellow rockfish	.08
<i>Sebastodes constellatus</i>	Starry rockfish	.12
<i>Sebastodes crameri</i>	Darkblotched rockfish	.10
<i>Sebastodes dalli</i>	Calico rockfish	.10
<i>Sebastodes diploproa</i>	Splitnose rockfish	.10
<i>Sebastodes elongatus</i>	Greenstriped rockfish	.06
<i>Sebastodes entomelas</i>	Widow rockfish	.09
<i>Sebastodes flavidus</i>	Yellowtail rockfish	.09
<i>Sebastodes goodei</i>	Chilipepper	.19
<i>Sebastodes helvomaculatus</i>	Rosethorn rockfish	.10

<i>Sebastodes hopkinsi</i>	Squarespot rockfish	\$.10
<i>Sebastodes jordani</i>	Shortbelly rockfish	.10
<i>Sebastodes levis</i>	Cow rockfish	.86
<i>Sebastodes melanops</i>	Black rockfish	.24
<i>Sebastodes miniatus</i>	Vermilion rockfish	.87
<i>Sebastodes mystinus</i>	Blue rockfish	.11
<i>Sebastodes nebulosus</i>	China rockfish	.18
<i>Sebastodes nigroinctus</i>	Tiger rockfish	.10
<i>Sebastodes ovalis</i>	Speckled rockfish	.13
<i>Sebastodes paucispinis</i>	Bocaccio	.25
<i>Sebastodes phillipsi</i>	Chameleon rockfish	.10
<i>Sebastodes pinniger</i>	Canary rockfish	.14
<i>Sebastodes rastrelliger</i>	Grass rockfish	.16
<i>Sebastodes rhodochloris</i>	Swordspine rockfish	.10
<i>Sebastodes rosaceus</i>	Rosy rockfish	.04
<i>Sebastodes ruberrimus</i>	Turkey-red rockfish	.53
<i>Sebastodes rubrivinctus</i>	Flag rockfish	.15
<i>Sebastodes sacicola</i>	Stripetail rockfish	.08
<i>Sebastodes semicinctus</i>	Halfbanded rockfish	.08
<i>Sebastodes serranoides</i>	Olive rockfish	.17
<i>Sebastodes serricops</i>	Treefish	.08
<i>Sebastodes umbrosus</i>	Honeycomb rockfish	.08
<i>Sebastodes vixillaris</i>	Whitebelly rockfish	.06
<i>Sebastodes zacentrus</i>	Sharpchin rockfish	.08

<i>Sebastolobus alascanus</i>	Shortspine channel rockfish	\$.08
<i>Sebastolobus altivelis</i>	Longspine channel rockfish	.08
<i>Anoplopoma fimbria</i>	Sablefish	.72
<i>Hexagrammos decagrammus</i>	Kelp greenling	.07
<i>Oxylebius pictus</i>	Painted greenling	.05
<i>Ophiodon elongatus</i>	Lingcod	.72
<i>Zaniolepis frenata</i>	Shortspine combfish	.25
<i>Zaniolepis latipinnis</i>	Longspine combfish	.25
<i>Artedius corallinus</i>	Coralline sculpin	.25
<i>Artedius creaseri</i>	Roughcheek sculpin	.25
<i>Artedius lateralis</i>	Smoothhead sculpin	.25
<i>Artedius notospilotus</i>	Bonehead sculpin	.25
<i>Chitonotus pugetenses</i>	Roughback sculpin	.25
<i>Clinocottus analis</i>	Wooly sculpin	.25
<i>Clinocottus glabiceps</i>	Mosshead sculpin	.25
<i>Clinocottus recalvus</i>	Bald sculpin	.25
<i>Enophrys taurina</i>	Bull sculpin	.25
<i>Hemilepidotus spinosus</i>	Brown Irish lord	.25
<i>Icelinus burchani</i>	Dusky sculpin	.25
<i>Icelinus cavifrons</i>	Pit-head sculpin	.25
<i>Icelinus filamentosus</i>	Threadfin sculpin	.25
<i>Icelinus fimbriatus</i>	Fringed sculpin	.25
<i>Icelinus quadriseriatus</i>	Yellowchin sculpin	.25
<i>Icelinus tenuis</i>		

<i>Jordania zonope</i>	Longfin sculpin	\$.25
<i>Leiocottus hirundo</i>	Lavender sculpin	.25
<i>Leptocottus armatus</i>	Pacific staghorn sculpin	.25
<i>Nautichthys oculofasciatus</i>	Sailfin sculpin	.25
<i>Oligocottus rubellio</i>	Rosy sculpin	.25
<i>Oligocottus snyderi</i>	Fluffy sculpin	.25
<i>Orthonopias triacis</i>	Snubnose sculpin	.25
<i>Radulinus asprellus</i>	Slim sculpin	.25
<i>Radulinus vinculus</i>	Smoothgum sculpin	.25
<i>Rhamphocottus richardsoni</i>	Grunt sculpin	.25
<i>Scorpaenichthys marmoratus</i>	Cabezon	.12
<i>Bothragonus swani</i>	Rockhead	.25
<i>Odontopyxis trispinosa</i>	Pygmy	.25
<i>Stellerina xyosterna</i>	Pricklebreast poacher	.25
<i>Xeneretmus latifrons</i>	Blacktip poacher	.25
<i>Liparis florae</i>	Tidepool snailfish	.25
<i>Liparis mucosus</i>	Slimy snailfish	.25
<i>Rathbunella hypoplectus</i>	Smooth ronquil	.25
<i>Kathetostoma averruncus</i>	Smooth stargazer	.00
<i>Hypsoblennius gentilis</i>	Bay blenny	.25
<i>Hypsoblennius gilberti</i>	Rockpool blenny	.25
<i>Alloclinus holderi</i>	Island kelpfish	.25
<i>Cryptotrema corallinum</i>	Deepwater blenny	.25
<i>Gibbonsia elegans</i>	Spotted kelpfish	.25

<i>Gibbonsia erythra</i>	Scarlet kelpfish	\$.25
<i>Gibbonsia metzi</i>	Striped kelpfish	.25
<i>Gibbonsia montereyensis</i>	Crevice kelpfish	.25
<i>Heterostichus rostratus</i>	Giant kelpfish	.25
<i>Neoclinus blanchardi</i>	Sarcastic fringehead	.25
<i>Neoclinus uninotatus</i>	Onespot fringehead	.25
<i>Paraclinus intergripinnis</i>	Reef finspot	.25
<i>Anarrhichthys ocellatus</i>	Wolf-eel	.25
<i>Apodichthys flavidus</i>	Penpoint gunnel	.25
<i>Ulvicola sanctaerosae</i>	Kelp gunnel	.25
<i>Xeroperca fucorum</i>	Rockweed gunnel	.25
<i>Anoplarchus purpurescens</i>	Cockscomb	.25
<i>Cebidichthys violaceus</i>	Monkeyface blenny	.25
<i>Xiphister atropurpureus</i>	Black prickleback	.25
<i>Xiphister mucosus</i>	Black prickleback	.25
<i>Xiphister mucosus</i>	Rock blenny	.25
<i>Aprondon cortezianus</i>	Bigfin eelpout	.25
<i>Lycodopsis pacifica</i>	Blackbelly eelpout	.25
<i>Melanstigma pammelas</i>	Black eelpout	.25
<i>Brosmophycis marginata</i>	Red brotula	.25
<i>Otophidium scrippsae</i>	Basketweave cusk-eel	.25
<i>Otophidium taylori</i>	Spotted cusk-eel	.25
<i>Icichthys lockingtoni</i>	Medusafish	.25
<i>Palometa simillima</i>	Pacific pompano	.25

<i>Tetragonurus cuvieri</i>	Smalleye squaretail	\$.25
<i>Sphyraena argentea</i>	Pacific barracuda	1.13
<i>Atherinops affinis</i>	Topsmelt	.02
<i>Atherinopsis californiensis</i>	Jacksmelt	.03
<i>Leuresthes tenuis</i>	California grunion	.01
<i>Citharichthys sordidus</i>	Pacific sanddab	.06
<i>Citharichthys stigmaeus</i>	Speckled sanddab	.05
<i>Hippoglossina stomata</i>	Bigmouth sole	.10
<i>Paralichthys californicus</i>	California halibut	3.50
<i>Xystreurus liolepis</i>	Fantail sole	.40
<i>Eopsetta jordani</i>	Petrale sole	.47
<i>Glyptoccephalus zachirus</i>	Rex sole	.11
<i>Hippoglossus stenolepis</i>	Pacific halibut	7.85
<i>Hypsopsetta guttulata</i>	Diamond turbot	.14
<i>Lepidopsetta bilineata</i>	Rock sole	.22
<i>Lyopsetta exilis</i>	Slender sole	.11
<i>Microstomus pacificus</i>	Dover sole	.41
<i>Parophrys vetulus</i>	English sole	.15
<i>Platichthys stellatus</i>	Starry flounder	.33
<i>Pleuronichthys coenosus</i>	C-O turbot	.07
<i>Pleuronichthys decurrens</i>	Curlfin turbot	.07
<i>Pleuronichthys ritteri</i>	Spotted turbot	.07
<i>Pleuronichthys verticalis</i>	Hornyhead turbot	.07
<i>Psettichthys melanostictus</i>	Sand sole	.24

<i>Syphurus atricauda</i>	California tonguefish	\$.01
<i>Gobiesox maeandricus</i>	Northern clingfish	.25
<i>Rimicola eigenmanni</i>	Slender clingfish	.25
<i>Rimicola muscarum</i>	Kelp clingfish	.25
<i>Verrunculus polylepis</i>	Fine-scale triggerfish	.25
<i>Lactorina diaphana</i>	Spiny trunkfish	.25
<i>Mola mola</i>	Mola	.60
<i>Porichthys myriaster</i>	Slim midshipman - Specklefin midshipman	.25
<i>Porichthys notatus</i>	Northern midshipman - Plainfin midshipman	.25
<i>Zalieutes elater</i>	Spotted batfish	.25
<i>Citharichthys xanthostigma</i>	Longfin sanddab	.25
<i>Isopsetta isolepis</i>	Scalyfin sole	.25
Agonidae		
Alepisauridae		
<i>Alepisaurus ferox</i>		
Alepocephalidae		
<i>Alepocephalus tenbrosus</i>		
<i>Allocyttus folletti</i>		
<i>Anoplogaster cornuta</i>		
Anooplogasteridae		
Anotopteridae		
<i>Anotopterus pharao</i>		
<i>Antimora rostrata</i>		
Argentinidae		

<i>Argyropelecus pacificus</i>	.50
<i>Aristostomias scintillans</i>	.50
<i>Astronesthidae</i>	.50
<i>Bathophilus Flemingi</i>	.50
<i>Bathylaconidae</i>	.50
<i>Bathylapo macrourum</i>	.50
<i>Bathylegidae</i>	.50
<i>Bathyuroichthys</i>	.50
<i>Benthalbella linguidens</i>	.50
<i>Borostomias panamensis</i>	.50
<i>Bothrocara brunneum</i>	.50
<i>Bramidae</i>	
<i>Brotulidae</i>	
<i>Careproctus melanurus</i>	.50
<i>Caristiidae</i>	
<i>Caristius macropus</i>	.50
<i>Caulophryne jordani</i>	.50
<i>Caulophrynidiae</i>	
<i>Centrolophidae</i>	
<i>Ceratiidae</i>	
<i>Cetomimidae</i>	
<i>Cetomimus</i>	
<i>Chauliodontidae</i>	
<i>Cheilodipteridae</i>	

Chiasmodontidae		
<i>Chiroplophius spilurus</i>	\$.50
Congridae		
<i>Cryptopsaros couesii</i>		.50
<i>Cyclothona acclinidens</i>		.50
<i>Cyema atrum</i>		.50
Cyemidae		
<i>Canaphos oculatus</i>		.50
Derichthyidae		
<i>Cerichthys serpentinus</i>		.50
<i>Desmodema polystictum</i>		.50
Cicrolene		
<i>Colichopteryx longipes</i>		.50
Eurpharynigidae		
<i>Eurypharynx pelecanoides</i>		.50
<i>Facciolella gilbertii</i>		.50
Gempylidae		
<i>Gemphlus serpens</i>		.50
Gigantactinidae		
<i>Gigantactis macronema</i>		.50
Giganturidae		
<i>Gnathophis catalinensis</i>		.50
Gonostomatidae		
<i>Howella brodiei</i>		.50

<i>Icichthys lockingtoni</i>	\$.50
Icosteidae	
<i>Icosteus anenigmaticus</i>	.50
Idiacanthidae	
<i>Idiacanthus antrostomus</i>	.50
Kali normani	.50
Kathetostoma averruncus	10.00
Lampridae	
<i>Lampris rigius</i>	10.00
<i>Lamprogrammus niger</i>	.50
<i>Lepidopus xantusi</i>	.50
<i>Lestidium ringens</i>	.50
<i>Linophryne coronata</i>	.50
Linophrynidae	
Liparididae	
Lophiidae	
Lophotidae	
<i>Lophotus cristatus</i>	.50
Luvaridae	
<i>Luvarus imperialis</i>	100.00
Macrorhamphosidae	
<i>Macrorhamphosus gracilis</i>	.50
Macrouridae	
Malacosteidae	

Melamphaidae	
Melanocetidae	
<i>Melanocetus johnsonii</i>	\$.50
<i>Melanonus zugmayeri</i>	.50
Melanostomiatidae	
Moridae	
Myctophidae	
Nemichthyidae	
<i>Nemichthys sxolopaceus</i>	.50
Neoscopelidae	
Nettastomatidae	
<i>Nezumia stelligidolepis</i>	.50
Nomeidae	
Ogcocephalidae	
<i>Oneirodes acanthias</i>	.50
Oneirodidae	
Ophichthidae	
<i>Ophichthus zophochir</i>	.50
Ophidiidae	
Opisthoproctidae	
Oreosomatidae	
<i>Otophidium taylori</i>	.50
Paralepididae	
<i>Pentaceros richardsoni</i>	.50

Pentacerotidae		
Poromitra crassiceps	\$.50
Psenes pellucidus		.50
Regalecidae		
Regalecus glesne		.50
Rondeletiidae		.50
Rondeletiidae		
Saccopharyngidae		
Saccopharynx		
Sagamichthys abei		.50
Scopelarchidae		
Scopelengys tristis		.50
Scopelosauridae		
Scopelosaurus harryi		.50
Searsiidae		
Serrivomeridae		
Serrivomer sector		.50
Sternoptychidae		
Stomias atriventer		.50
Stomiatidae		
Symbolophorus californiensis		.50
Taractes longipinnis		.50
Tetragonuridae		
Tetragonurus cuvieri		.50

Trachipteridae	
Trichiuridae	
Uranoscopidae	
Xeneretmus latifrons	\$.50
Zalieutes elater	.50
Zaniolepididae	
Zaniolepis frenata	.50
Aeidae	
Zenopsis nebulosa	.50
Zoarcidae	

Species	Common Name	Estimated Value Per Animal
<u>Mammalia</u>		
<i>Enhydra lutris</i>	Sea Otter	\$ 1,500.00
<i>Eumetopias stelleri</i>	Steller sea lion	210.00
<i>Zalophus californianus</i>	California sea lion	75.00
<i>Phoca vitulina</i>	Harbor seal	87.50
<i>Mirounga angustirostris</i>	Northern elephant seal	1,050.00
<i>Stenella graffmani</i>	Long-snouted dolphin	200.00
<i>Delphinus delphis</i>	Common dolphin	140.00
<i>Lissodelphis borealis</i>	Northern right whale dolphin	140.00
<i>Lagenorhynchus obliquidens</i>	Pacific striped dolphin	123.00
<i>Orcinus orca</i>	Killer whale	1,050.00
<i>Pseudorca crassidens</i>	False killer whale	700.00
<i>Globicephala macrorhynchus</i>	Pacific pilot whale	1,225.00
<i>Phocoena phocoena</i>	Harbor porpoise	56.00
<i>Phocoenoides dalli</i>	Dall porpoise	70.00
<i>Ziphius cavirostris</i>	Cuvier beaked whale	2,000.00
<i>Eschrichtius gibbosus</i>	Gray whale	21,000.00

Species	Estimated Value	Estimated Value
<u>Plants</u>		
<i>Abronia latifolia</i>	\$11.00 per ton	Cystoseira osmundacea
<i>maritima</i>	" " " " "	<i>Dictyopteris zorarioides</i>
<i>umbellata</i>	" " " " "	<i>Dictyota binghamiae</i>
<i>Acrocorium uncinatum</i>	" " " " "	<i>flabellata</i>
<i>Agardhiella coulteri</i>	" " " " "	<i>Distichlis spicata</i>
<i>tenera</i>	" " " " "	<i>Ectocarpus granulosus</i>
<i>Anisocladella pacifica</i>	" " " " "	<i>Egregia laevigata</i>
<i>Atriplex leucophylla</i>	" " " " "	<i>Eisenia arborea</i>
<i>Bossiella dichotoma</i>	" " " " "	<i>Endarachne binghamiae</i>
<i>insularis</i>	" " " " "	<i>Enteromorpha compressa</i>
<i>orbigniana</i>	" " " " "	<i>intestinalis</i>
<i>Bryopsis corticulans</i>	" " " " "	<i>Erythrocystis saccata</i>
<i>Callophyllis flabellulata</i>	" " " " "	<i>Frankenia grandiflora</i>
<i>violacea</i>	" " " " "	<i>Gastroclonium coulteri</i>
<i>Centroceras clavulatum</i>	" " " " "	<i>Gelidium cartilagineum</i>
<i>Ceramium caudatum</i>	" " " " "	<i>coulteri</i>
<i>codicula</i>	" " " " "	<i>purpurascens</i>
<i>eatonianum</i>	" " " " "	<i>Gigartina armata</i>
<i>Chaetomorpha aerea</i>	" " " " "	<i>canaliculata</i>
<i>torta</i>	" " " " "	<i>gigantea</i>
<i>Chondria californica</i>	" " " " "	<i>harveyana</i>
<i>nidifica</i>	" " " " "	<i>leptophrychos</i>
<i>Chondrus crispus</i>	" " " " "	<i>spinosa</i>
<i>Cladophora trichotoma</i>	" " " " "	<i>Gracilaria confervoides</i>
<i>Codium fragile</i>	" " " " "	<i>textorii</i>
<i>Colpomenia sinuosa</i>	" " " " "	<i>cunninghamii</i>
<i>Conchocelis</i>		<i>verrucosa</i>
<i>Convolvulus soldanella</i>	" " " " "	<i>Gracilaria andersonii</i>
<i>Corallina officinalis(v)</i>	" " " " "	<i>sjeestedtii</i>
<i>chilensis(pl)</i>	" " " " "	<i>Gymnogongrus leptophyllus</i>
<i>vancouverensis</i>	" " " " "	<i>Halidrys dioica</i>
<i>Cryptoptilum coralinaria</i>	" " " " "	<i>Haploappus ericoides</i>
<i>cripsi</i>	" " " " "	<i>Hesperophyicus harveyanus</i>
<i>violacea</i>	" " " " "	

<u>Plants</u>	<u>Estimated Value</u>	<u>Plants</u>	<u>Estimated Value</u>
<i>Hildenbrandia</i>	\$11.00 per ton	<i>paniculata</i>	
<i>prototypus</i>	" " "	<i>Porolithon</i>	\$11.00 per ton
<i>Janczewskia</i>		<i>Porphyra</i>	" " " "
<i>lappacea</i>	" " "	<i>perforata</i>	" " " "
<i>Jania</i>		<i>Postelsia</i>	" " " "
<i>natalensis</i>	" " "	<i>palmaciformis</i>	" " " "
<i>tenella</i>	" " "	<i>Prionitis</i>	" " " "
<i>Laurencia</i>		<i>cornea</i>	" " " "
<i>pacifica</i>	" " "	<i>lanceolata</i>	" " " "
<i>spectabilis</i>	" " "	<i>Pterocladia</i>	" " " "
<i>diegoensis</i>	" " "	<i>pyramidalis</i>	" " " "
<i>subopposita</i>	" " "	<i>Pterosiphonia</i>	" " " "
<i>Leptocladia</i>		<i>baileyi</i>	" " " "
<i>binghamiae</i>	" " "	<i>dendroidca</i>	" " " "
<i>Lithophyllum</i>		<i>Ralfsia</i>	
<i>Lithothamnium</i>		<i>Rhodoglossum</i>	
<i>giganteum</i>	" " "	<i>affine</i>	" " " "
<i>Lithothrix</i>		<i>Rhodymenia</i>	
<i>aspergillum</i>	" " "	<i>californica</i>	" " " "
<i>Macrocystis</i>		<i>pacifica</i>	" " " "
<i>pyrifera</i>	\$25.00 per ton	<i>Salicornia</i>	
<i>Melobesia</i>		<i>bigelovii</i>	" " " "
<i>mediocris</i>		<i>virginica</i>	" " " "
<i>Mesembryanthemum</i>	\$11.00 per ton	<i>Sargassum</i>	
<i>chilense</i>	" " "	<i>agardhienum</i>	" " " "
<i>crystallinum</i>	" " "	<i>palmeri</i>	" " " "
<i>edule</i>	" " "	<i>Scytoniphon</i>	
<i>Murrayellopsis</i>		<i>lomentaria</i>	" " " "
<i>dawsonii</i>	" " "	<i>Smithora</i>	
<i>Nienburgia</i>		<i>naiadum</i>	" " " "
<i>andersoniana</i>	" " "	<i>Spartina</i>	
<i>Oenothera</i>		<i>foliosa</i>	" " " "
<i>cheiranthifolia</i>	" " "	<i>Spermatophyllum</i>	
<i>Pachydictyon</i>		<i>snyderae</i>	" " " "
<i>coriaceum</i>	" " "	<i>Suaeda</i>	
<i>Pelagophycus</i>		<i>californica</i>	" " " "
<i>porra</i>	" " "	<i>Taonia</i>	
<i>Pelvetia</i>		<i>lennebackerae</i>	" " " "
<i>fastigiata</i>	" " "	<i>Ulva</i>	
<i>Petalonia</i>		<i>angusta</i>	" " " "
<i>Petrospongium</i>		<i>californica</i>	" " " "
<i>rugosum</i>	" " "	<i>lactuca</i>	" " " "
<i>Phyllophora</i>		<i>Zostera</i>	
<i>clevelandii</i>	" " "	<i>marina</i>	" " " "
<i>Phyllospadix</i>		<i>marina(v)</i>	" " " "
<i>scouleri</i>	" " "	<i>latifolia</i>	" " " "
<i>torreyi</i>	" " "		
<i>Plocamium</i>			
<i>coccineum</i>	" " "		
<i>pacificum</i>	" " "		
<i>frontispice</i>	" " "		
<i>violetaceum</i>	" " "		
<i>Polynema</i>			
<i>latissima</i>	" " "		
<i>Polysiphonia</i>			
<i>hondryi</i>	" " "		

Economic Damage Assessment
of Flora and Fauna Resulting
from Unlawful Environmental Degradation
Prepared by
Frederick E. Walgenbach
Senior Resources Economist
California Department of Fish and Game
May 1979

INTRODUCTION

Resource decision making by land developers, environmentalists, public administrators, and jurists has become increasingly more important with regard to our natural resources as more and more development expands onto undeveloped acreage. When the encroachment of development transcends physical boundaries and inflicts unnecessary alteration within boundaries, then there has to be an accounting. For, after all, man is simply a steward of the land and society must maintain order for the generations to come.

When accounting for and evaluating damages to the natural environment, the evaluation must be more encompassing than for benefit evaluation. Economists have been designing procedures to evaluate beneficial effects of various developments for years. The principal beneficial effect of trout fishing, for example, is not the trout but rather the recreational experience of fishing. One must catch trout in order to maximize the fishing benefit, but need not take home any to fulfill the fishing experience. But in the case of damage evaluation, the fish, as well as the fishing, become the pertinent entities to be evaluated. Damage assessment involves in addition to the value of recreation, the well-being of the resource, the habitat and the well-being of the general public. This distinction must be emphasized and a conscious awareness of this difference must be maintained. The evaluation of the various factors contributing to these components is the fundamental objective of this paper in an attempt to determine a total damage value for unlawful environmental alteration.

The task generally begins with the preparation of a species list of the plants and animals affected by this environmental change. After the plants and animals affected are identified, the recreational use associated with these flora and

fauna must be determined. Then there is a need to examine the enjoyment potential which exists by the sheer availability of these flora and fauna. Finally, a determination of the monetary value for each must be made. Once the various factors have been identified, they must be related to their impact on the well-being of society. To do this, a method to calculate the extent of the damages, the time frame under which those damages will continue, the unit value for each damage segment, and the appropriate discount rate to apply in assessing the damage values must be derived.

Since fish and wildlife resources are legally considered the property of the state and are administered as a public resource, the economic value of these wildlife resources cannot always be determined through the normal market forces of supply and demand. Many of these resources, referred to as extra-market goods, are not subject to the auction effects of the market and consequently cannot be priced at the point of equality between supply and demand. Due to their widespread appeal and importance, wildlife resources, like our highways, schools, national defense and national parks, have been relegated to control by state and federal agencies to insure their availability to all segments of our society and not just to those who would be financially able to compete if these resources were subject to the market mechanism. Yet damage assessments are generally based upon some estimate of a market value for each natural resource element plus the associated effects connected therewith. Because of the legal trust condition of state property rights, fish and wildlife resources are rarely sold. Those that are sold, such as furbearers and a few fish which are harvested commercially, are subject to seasons, bag limits, and method of take. They are also considered surplus to the population needs and are only sold after first capture. The state does not provide a market,

but does allow such a market to develop after first capture.

As a result of the nonmarketable quality of our wildlife resources, it is extremely difficult to place equitable value on them. For those species which are nonmarketable resources, the mechanism of determining an equitable value assignment will be predicated on a synthesized replacement cost, plus the additional associated values to each species for a use value and an existence value. Damages to the land and the associated flora will be calculated upon the cost of restoration or negotiated mitigation.

Some species of animals and plants in the natural environment are marketable commodities. Other species have no apparent commercial value, while still others could be marketable but our society has chosen not to allow market transactions of these animals. A brief explanation of the economic principles of natural resources values should make this important distinction clear.

Understanding the relative nature of resources gives us important insights about why certain species are market commodities and others are not. Quite simply, our society makes zero market use of many species and these species have no market price. This lack of market price does not mean that these species have zero value to man. Attempting to derive a market price as a measure of value for goods and services not normally transacted in the market place may produce a totally unacceptable value.

To appraise the value of those species which are not bought or sold, we must analyze the nature of a market transaction. This analysis will not only suggest ways to value nonmarket goods, it will also point out the weakness of market prices as an index of value for market commodities.

A transaction between two or more individuals can take on a multitude of forms. In our society, economic transactions usually involve an exchange of goods or services for money. Occasionally goods or services are directly exchanged one for another without the use of money. Such transactions have economic value even though we do not measure this value in dollars. All economic transactions have the same essential elements. Goods and/or services are exchanged between two or more individuals and the items exchanged have value to both parties. These aspects of transactions are very important to understanding why so many valuable goods are not market commodities. In order to execute an economic transaction, both parties must have information about the value of the commodities exchanged, and they must enter into a policeable contract. Each of these elements of a transaction has costs. Reaching a contract for the exchange can also be costly. Policing some exchanges can be very difficult. When any of these costs or any combination of these costs become excessive, markets fail to develop.

A common form of market failure results from a combination of the excessive contractual and policing costs associated with collective consumption. Such necessities as defense or clean air are consumed collectively by all members of the society. It is very difficult to exclude any individuals from the benefits of such collective consumption. Thus, even if contracts could be formed between certain individuals to provide for such collective goods, it would not be possible to exclude those who did not pay. It is common and proper that governments provide collectively consumed goods by expending tax revenues. In such cases, it is customary to estimate the dollar value of the goods as being at least as large as the cost of providing for them. Using the dollar costs of providing a good as a proxy for the actual dollar value of the good has wide acceptance. Elected officials make value judgments for the society and avoid the excessive cost of private contracts to provide the same goods. Such procedures are helpful if one must estimate dollar values for a wide class

of nonmarket goods.

The common resource property nature of the resources involved may explain more readily why a market price is difficult to derive. The economic rent (the value of the resource to a private owner) is bid away by the resource users, thereby reducing or eliminating a true market value figure for the resource.

Society forbids market sales of many goods that could be subjected to market transactions. Abolition of slavery and the continuing illegality of selling certain drugs are examples. The long enduring and widespread laws against the sale of ~~sport caught~~ migrants, waterfowl, and big game fish are more pertinent examples. Our society has made collective decisions to exclude these goods and many others from market transactions. The ever-present forces of supply and demand still operate in controlling the rate of exchange of these commodities. Prices, however, are not directly used to allocate the supply between competing users. Still, markets often develop for the services necessary to procure these goods without directly selling the resource itself. Sportfishing partyboats and waterfowl hunting clubs are two pertinent examples. All too often managers not sufficiently aware of the history of why certain goods are excluded from the market domain, attempt to use the expenditures for such activities as sportfishing or hunting as indicators of what prices might prevail if these were market commodities. The prices computed by such techniques usually have little relationship to the value of the nonmarket goods. This is true for both total expenditures and net expenditures.

What we see in the preceding discussion is many reasons why a dollar value is not, or should not, be assigned to certain nonmarketable commodities. If we concur with the above statement, we can see why deriving an economic benefit

value from and/or for certain species of fish and wildlife is questionable and understand why deriving any value is so difficult. However, if we can reconcile to the fact that a damage value is needed in order to derive some penalty for natural resource destruction and strive to determine that damage value, we may avoid much of the criticism and shortcomings associated with nonmarketable commodity evaluation.

Damage Value Determination

The damage value will, in most cases, be a greater figure than the benefit value. A true benefit value implies that all relevant beneficial effects are accounted for and evaluated. This would include all the direct effects and all the indirect effects as well. But benefits are constrained by one's income and one's willingness to expend capital or trade pleasurable experiences. Damage perceptions, while influenced by one's income, are less constrained. Generally, the loss has occurred and the subject of competing use does not exist. Hence, the damage value follows closely along the lines of welfare economics.

Public and private decision making involving natural resources has become an increasing concern of the people of California. All too often, a large scale alteration of natural resources have gone virtually unchecked or with little regard to the outcome or the consequences to the natural resource by those decision makers. In recent years, with the continued decline in the physical areas still remaining in the natural state, law makers, decision makers, and the public in general have taken a considerably greater interest in the welfare of our natural resources. In order to monetarily account for these natural resources, economists have been attempting to derive procedures for placing equitable values on them. A major problem with giving proper consideration to the fish and wildlife resources is complicated by the fact that the vast majority of these resources are in public ownership. That is, they are owned by no one

yet belong to all. It is at the point of first capture that individual ownership takes place. Those public commodities subject to ownership by capture are referred to as Common Property Resources. Fish and wildlife resources utilized in recreational fishing and hunting and commercial fishing are the more prevalent examples of the Common Property Resource concept. The effect of this situation is to require the development of a simulated market price for those commodities in order to assess the overall value of those resources in terms of public resources decision making (Meyer 1978).

In this particular section of this paper, the author will attempt to utilize welfare economics as a proxy for establishing an existence value for the fish and wildlife resources of California. Resource economists generally agree that in the social welfare context of natural resource management gainers should be able to compensate losers whether actual payments are made or not. Meyer (1978) in his review of the economic literature found ample support for this position from such notables as Pareto, Kaldor, Hicks and Scitovsky. His paper specifically references the works of Mishan (1971-74) and the work of Krutilla and Fisher (1975) on the concept of property rights. They conclude that a recreationalist will be constrained by his income in his attempt to secure the property rights from the competing use of the resource when the competing use seems to have prior control of the resource. But where the recreationalist has the initial rights, value is determined by the unconstrained minimum amount the recreationalist will accept in exchange for his right. If these measures of value are not the same, assignment of property rights can determine the outcome of the decision to allocate a resource to its optional or highest value.

The application of this concept and the difference between willingness to pay and willingness to sell determine the welfare value or damage value within this paper. The entire premise is that under the damage criteria, any reallocation of societies, gainers must be able to compensate losers. In this

context, polluters, developers, and users of the fish and wildlife resources must clearly compensate society for the loss of those resources. The economic paper by Meyer (1978) provides numerous examples where resource users must compensate losers and thus the willingness to sell becomes a measure of lost benefits, the application of which is fully consistent with the willingness to pay as a measure of increased benefits.

The difference in willingness to pay and willingness to sale varies in the magnitude of from 1 to 4, to 1 to 20. In this analysis, the smaller values will be utilized. The rationale for using a lesser value is to reduce the controversy over the evaluation by using conservative values, but at the same time using values acceptable by the state at this time. A pertinent point to keep in mind is that the State of California is not interested in collecting large punitive damages, but rather in protecting and preserving the natural resources. Large punitive damages may deter future violations, but do nothing for past damages unless restoration becomes part of the damage judgment.

The basic values used in assessing the monetary damage or loss of natural wildlife resources will be through: (1) Replacement value, (2) use value, and (3) Existence value. Hence, for purposes of assessing values for various forms of wildlife destroyed as a result of negligence or uncontrollable mishaps, for which a given party is responsible, a minimum damage value will be assigned and assessed against the responsible party. By definition then, the damage value is assumed to be equivalent to the average cost of providing the species involved, plus the potential recreational and aesthetic contribution made to society. The damage value to land and for habitat will be assessed as being equal to the cost of restoration or negotiated mitigation.

To define what the damage value is, is fairly simple. The task of determining the damage value is something again. There are over 400 species of birds and 220 species of mammals in California; arriving at a damage figure for each of these species would be an awesome task. In order to simplify the evaluation technique, a series of evaluation categories were established. These categories are basically 3 major types: one to determine replacement cost, one to determine recreational use, and one to determine the existence value to society. A composite of these 3 values constitutes the damage value assigned each species.

Replacement Value

The replacement value is an estimate of an actual calculation of the cost of replacing the resource in question. In most instances, there is a time lag to reproducing and replacing the resource. In those cases a present worthing calculation should be employed to bring all values to a comparable time frame.

In still other instances, some resources cannot be replaced. In those cases a regional or national objective will need to be considered. For example, if one is concerned only on a regional level, this replacement may be accomplished by importing from another area. If the national scene is important, importation from a foreign country may provide the replacement. However, if one is looking at the Big Picture, depletion of the natural resources may mean a loss forever, in which case there would be no monetary amount which could replace it.

Several alternatives exist, one is that the resource is in sufficient supply that it is virtually unexhaustible. In which case the replacement value would be zero or nearly so. The second alternative would be to assume that since there is no replacement possibility the value would be astronomical, and therefore a substitute in the form of some mitigation would be warranted and justified. A third

alternative would place an evaluation somewhere between the first two. Since we are looking to established damage value, which generally implies an after-the-fact situation, we can assume a minimum value as being the cost of the least costly substitute.

Use Value

The use value has two component parts. One is the nonconsumptive use, such as bird watching; the other part is the consumptive use, such as waterfowl hunting. Each contributes to the total use value, that is, they are additives.

^{1/} Nonconsumptive use values are generally higher than consumptive use values and are based upon the recreational enjoyment derived from viewing, photographing, and studying the resource in its natural setting. The U.S. Fish and Wildlife Service (1977) has determined values per visitor-day for various types of non-consumptive activities. By utilizing these values in conjunction with the estimates of use derived for each activity, a monetary value can be computed for each activity. The summation of the activity values determines a monetary value which is used to represent the nonconsumptive use value.

The consumptive use (hunting and fishing) values are derived in generally the same manner as the nonconsumptive use values. In the areas where the market mechanism can work the supply and demand relationship determines the consumptive use value. In many instances, the cost of providing the recreational activity is priced below the true market value. Therefore, there is a need to know the

^{1/} Horvath, in his study of the southeastern United States, researches this conclusion. Also, the values derived in the National Survey of Hunting and Fishing supports this conclusion.

condition and assumptions under which a market price was determined. In most instances, it is the best to utilize a basic rationale. For this evaluation, I have selected the rationale and values derived in the U.S. Fish and Wildlife Service's Report (1977). The application of these values will provide the values for this analytical approach.

Existence Value

The existence value, like so much of the other values, is difficult to assess. There is no question that a value does exist. The controversy develops over the monetary value assigned.

There are two possible methods of assessing the existence value. It seems that they are mutually exclusive and subject to the conditions which exist at the time of evaluation. The one is an aesthetic value; that is the value derived out of the simple enjoyment of the resource. The knowledge that something exists and is there for the observer to enjoy now and in the future. The second is the feeling of loss. The psychological letdown prompted by the knowledge that something which did exist is gone and lost forever.

How one handles the existence value opens the door to confrontations and disagreements; not in the concept of a value, but in monetary value assigned. This paper will attempt to develop a rationale that minimizes the disagreements and provides a logical methodology for assessment.

PROCEDURES FOR EVALUATION

With the tools at hand, there is a need to designate the implementation procedure. Each of the three major components along with their sub parts will be discussed and outlined as to their implementation. The three components are additives and jointly determine the total damage value being sought.

Replacement Costs

When calculating the replacement cost, four potential methods are proposed. They will be presented in the order of desirability.

Analysis of Existing Data - To begin with, collect the existing data. Where a market condition exists, that is, where the market value of the resource under consideration has already been determined, the task is a simple one and virtually completed. Where there isn't any market value, one can sometimes be estimated from available data. Collection of the various input components of labor, capital, and materials necessary to reproduce the resource in question and an estimate of the value of each part will produce a value which is usable as a replacement cost. Consideration for time lag is essential to proper evaluation. If replacement and maturity takes more than one year, some present worthing procedure should be utilized.

Synthesis on Nonexisting Data - Where data does not exist or is incomplete, the task is to develop or derive the necessary data. Assumptions, logical reasoning, and historic patterns and policies can many times illustrate a course of action and an acceptable derivation of a synthesized replacement cost. A laundry list of all the potential variables which could influence the value calculation should be checked and considered for effect on the synthesized value.

Estimate Value When Synthesis is Impractical - This procedure is really lacking in any sophistication and would not be desirable if one of the other above alternatives were available. However, lacking the time or the data availability a professional estimate would be desirable to no estimate at all.

Again a check list of all the potential pertinent items should be made and considered in the estimate.

Verbalize Nonmonetary Values - When all else has been exhausted, the use of nonmonetary consideration should be presented. This discussion will tend to support other data and may tip the scales in favor of a particular position which may have gone the reverse without the verbal discussion.

NonConsumptive Use Value

The nonconsumptive use value is the value derived by the utilization of the resource without altering its basic character or destroying it.

Primarily the nonconsumptive use figures will be a recreational value derived from such activities as camping, swimming, boating, sightseeing, and bird watching. Activities such as fishing, which can be a consumptive use of the fishery resource would be a nonconsumptive use of a stream or river. There may be many activities which are both consumptive and nonconsumptive depending upon the resource under consideration.

Recreational values have been studied extensively. There are many reports published on how to calculate the recreational benefit in either user days or dollars. Of the various techniques used, all the results are pretty well accepted. However, each individual working in the recreational field has his preferred method of calculation.

Whichever procedure is used to calculate recreational benefits, the magnitude of user days or dollar amounts is about the same.

Consumptive Use Values

The consumptive use values are determined in the same manner as the nonconsumptive figures. The only difference is that "one time only" use. Here again, one must be specific in the value he is seeing. The use of a forest for hunting is a

nonconsumptive use of the forest while the hunting is a consumptive use of the animals. The destruction of the forest by logging or fire could reduce both the forest and the hunting, thereby being consumptive in both cases. With logging, the consumptive use would be a beneficial use. The fire would be a nonbeneficial use to both resources.

Again, the procedure for evaluation would be to determine the use, determine the value to be applied per each unit of use, and then calculate the total effect. The mechanism for accomplishing these calculations are spelled out in many resource manuals.

Existence Value

The existence value is a psychological value determined by what one thinks or how one feels. The value at first glance appears to be completely elusive and noncomprehensible. However, closer examination reveals the value does exist and that, although somewhat subjective, it can be estimated in quantitative terms.

The value has two sides to it which are mutually exclusive. On the one side is the aesthetic value derived by the knowledge that something exists and is there to enjoy. The public is willing to expend money to preserve certain natural resources, knowing full well that they will never personally utilize that resource.

On the other side of the coin is the psychic damage; that feeling of personal loss created by the knowledge that something that once was, is no more.

The psychic damage is the damage to the people. This people damage is represented by the total loss to society in knowing that a natural resource is threatened. The psychic damage is that human emotional reaction which persists any time disaster happens. It is the genuine feeling of distress felt by all those who have sympathy for the unfortunate objects of destruction, whether those objects be people suffering from floods or fire, or whether those objects are desert big-horn sheep suffering potential extinction from poachers.

This psychic damage is real and it can be measured in monetary terms. Contributions to Red Cross and all other charities in some ways reflect psychic damage value. Clothing, food, and shelter given to a neighbor when he has suffered a fire loss might be considered as representing psychic damage. Contributions in time, money and aid to the sea birds damaged in an oil spill is a measure of psychic damage value.

How then does one evaluate the monetary value of aesthetics or psychic damage? In the real sense, a survey asking the questions, "How much would you pay to have prevented the willful destruction of a natural resource from taking place?" Or better yet, "How much would I have to give to compensate you to make you whole again?" Of course, the answer to these two questions will differ with the latter question generally giving larger values. The accumulated results of such a survey would be a measurement of the existence value.

The two types of questions represent two methods of economic evaluation commonly referred to as the "willingness to pay" approach and the "requirement for compensation" approach. Generally speaking, the "willingness to pay" approach is relevant for enhancement of wildlife opportunities and the "requirement for compensation" pertains to losses associated with degradation of natural resources, Meyer (1978).^{2/} As noted above, requirements for compensation will exceed willingness to pay by a factor dependent upon relative importance of the activity or resource under consideration. Works by Meyer (1975) and Bohm (1971) reveal that the smaller the area under consideration and the more important those areas are, the closer the two values are to one another.

For a more detailed discussion, see Meyer, 1978. Recreation values for Wildfowl and Waterfowl - Fraser River Foreshore

DAMAGE VALUE ESTIMATE CALCULATIONS

The damage values resulting from natural resource alteration are to be calculated on the loss of fish and wildlife, the loss of recreational use associated with the affected area, the damages sustained by the environment, and the damages affecting existence values (aesthetic and psychic damage values). For this report, all values computed or collected have been adjusted by the Consumer Price Index to 1978 dollars.

Fish and Wildlife Replacement Costs

Monetary damages to fish and wildlife have been primarily assigned to the losses to birds, mammals, and fish. Consideration is under study to examine the monetary damages to reptiles and amphibians, the invertebrate terrestrial and marine life. A substantial amount of invertebrate life can exist in a very small area of natural environment. A small unit value assigned to each invertebrate animal in a highly populated area will result in very high total values. Many of these invertebrate creatures are at the beginning of the food chain and are exceedingly important in the ecosystem. Reptiles and amphibians are creatures which, like the invertebrates, are not considered too desirable by many people. Most people view them as creepy, crawly, hazardous creatures rather than as beneficial, ecologically necessary creatures for the balance of nature. Society must preserve and protect these animals through a detailed accounting and proper project accountability. Proper values and damage assessments for their loss will provide the awareness necessary to help insure their protection. Development of an evaluation procedure is under way for these creatures and should provide an acceptable monetary assessment for damages.

Replacement Costs for Birds

A significant part of all habitat losses is manifested in the impact it has on the bird life. In the case of an oil spill, the loss of bird life may be directly due to bird deaths. In environmental alteration situations, the bird losses are more subtle and birds just seem to disappear. Available habitat for breeding and feeding for resting and nesting is essential to the maintenance of bird life.

As was stated earlier, damage estimates generally employ an after-the-fact loss. Assessing the damage to bird life, then, is conditioned first on establishing a replacement value for each bird. This is done through the following mechanism.

For the most part, market values of the birds affected are not available. Therefore, a synthesized approach to a value structure must be used. Reproduction of the various species appears to be most dependent upon the availability of habitat and conducive reproductive conditions. Therefore, our evaluation centers around habitat and the various modifications required to reflect current circumstances.

Five categories of habitat were conceived for the bird species. The first category was breeding in captivity. If a particular species of bird would breed anywhere, including in captivity, it was assumed to have the least amount of propagation problems. Birds that were in this category were assigned a breeding habitat value equal to the cost to the Department of Fish and Game of buying pheasants from a game breeder. This price in 1978 was \$5.50 per bird.

Using the artificial habitat cost of production and assigning it the lowest value, assumes that this type of breeding characteristic is the most productive and therefore the least expensive method of reproduction. This is obviously not true, for if breeding is allowed to take place in the natural environment there is virtually no cost assignable to reproduction. What can be said, though, is that an artificial habitat operation is less expensive than providing single purpose natural breeding grounds.

Establishing a second category called "unrestricted breeding" will provide the means of accommodating the natural breeding and the artificial breeding. A

figure 1½ times the cost of captivity breeding is used for the "unrestricted breeding". The cost is greater because of the increased management that would be required if management and monitoring was carried out to the same degree as in captivity.

Since we have stated that breeding in captivity in essence includes all other types of breeding circumstances and is the least expensive and we know that unrestricted breeding requires very little management or cost, then some modifications must be allowed to put these two subcategories in their proper perspective.

A modification related to availability of habitat will accomplish the necessary adjustment. If habitat is plentiful, a factor of one-half will be used to adjust "breeding habitats". Thus, if a species needs as a minimum a natural setting and habitat is plentiful, the cost would be less than the artificial habitat. However, if habitat is restricted or worse yet, scarce, then without providing some natural environment, the artificial habitat may be the most practical method of providing replacement stock. Therefore, the factor for "restricted" is set at two and the factor for "scarce" is set at four.

There are three more subcategories under breeding habitat which exemplify the importance of habitat; they are "restricted breeding (no management)", "managed natural environment" and "secluded natural environment".

If breeding cannot be accomplished in an artificial environment and a more natural setting is required, then establishing a natural setting may be the next alternative. For an unmanaged natural environment, a value of \$94.50 is used. This value is based upon the value of marsh land habitat (Tubbs Island) with no management or operation and maintenance cost. The capital value (\$580 per acre) amortized over 10 years at 7 percent and adjusted for CPI comes to \$94.50 per acre. This type of environment has a low productive

capability and most likely would require in excess of one acre per bird produced. However, so as not to over-value the replacement cost per bird, the \$94.50 (one acre) value was used in this category. A value of \$738 is established to represent the fourth category, managed natural environment. This value is estimated from bird sanctuaries owned and operated by the Audubon Society, and represents a capital cost amortized over 10 years at 7 percent plus annual operation and maintenance charges.

The fifth situation exists for rare and endangered species, such as the condor. Here approximately \$20 million in capital outlay has been spent to accommodate 60 birds. This cost produces an estimated value of \$73,500 per bird based on a 10-year amortization period at 7 percent interest and adjusted for CPI. While it is true that these reserves and sanctuaries are used for other purposes than breeding grounds, they were set aside to ensure the reproduction of the species. In view of the fact that these lands have more than one use, only half of the amortized value was used to set the habitat value at \$36,750. These figures developed above for breeding ground are assumed to be in the proper magnitude and reasonably accurate to represent the cost of reproduction.

Other features besides availability of habitat tend to modify the breeding cost as well. Such things as number of offspring, and breeding cycle have a direct influence on the cost of the particular species. To account for these additional items, various factors have been derived to modify the reproduction cost.

Accounting for the number of offspring and the breeding cycle was handled in a simplistic way. Quite assuredly there is some direct relationship to these items and the damage value per species. Therefore, to limit the impact of these factors on the value derived, the least important subcategory for the number of

offspring was given the weight of one, and each succeeding subcategory was weighted at twice the preceding one. For the breeding cycle, a factor of one was given to "once per year", doubled for "once every other year", and halved for "twice per year". To utilize these factors the number of offspring factor is multiplied by the breeding cycle factor; the result of which is used to increase or decrease the dollar value assigned to the habitat factor. The various factors for these two categories are listed below:

<u>Number of Offspring</u>	<u>Factor</u>	<u>Breeding Cycle</u>	<u>Factor</u>
0-1	4	2 per year	1/2
2-3	2	1 per year	1
4 or more	1	1 every other year	2

Adjusting the unit values to the Current Consumer Price Index (CPI) and consolidating these values and factors into one value per species produces the estimated cost of replacement per bird. Multiplying the total number of birds lost per species and summarizing for all species gives the total replacement damage value.

Replacement Cost of Mammals

Mammals are another major factor in wildlife damage assessments. There are some 220 different species of mammals in California. Again, trying to evaluate each particular animal would require a considerable amount of time and time is usually not available when damage assessments need to be made. To reduce the time commitment and still derive a reasonable value, a similar evaluation procedure to that of the bird species was devised.

Comparable categories to those used with the birds were established for the lowest value used to price the various size mammals. When habitat type became more important, the same three upper habitat category established for birds was utilized. The lowest value used for small mammals is the retail value of small rodents (rats, rabbits, etc.), the intermediate size mammals were priced at the retail value of small animals (raccoon, fox, skunk), the

third category was established for deer. In the first category, there are markets dealing in the associated animals. Checking with scientific supply houses and various wholesale and retail pet stores, a \$5.00 value was determined as representative for the small animal category.

For the intermediate size animals, there aren't any true markets in terms of breeding; however, the price of pelts does provide some indication of value. It appears obvious why some rearing of fur animals doesn't exist. When a striped skunk pelt only brings \$3.00 and the cost of simply maintaining a pair of skunks is \$224/MO, there is clearly a negative B/C ratio for a breeder contemplating rearing skunks for their pelts. However, that fact remains that to acquire a striped skunk, if they are not available any place else would require breeding them at whatever the cost. Thus, the pelt price does not truly reflect the replacement value at the lower end of costs and may overstate the replacement cost value at the upper end. This is true because there must be costs assigned to preparing and preserving the pelts from the animal that would not be incurred if the animal were released live into the wilds as replacement stock.

Considering the low values are below the replacement costs and the high values are above the replacement costs, one could rationalize that the average value for each would closely represent a replacement cost and that an average value for a representative species for all intermediate size animals would be acceptable for damage assessment purposes.

The following tabulation lists the average pelt price for various species of animal. The representative replacement value is identified therefrom.

	Pelt Value	Replacement Value		Pelt	Replace.
Bob cat	\$140.00	\$33	Opposum	\$3.18	\$5.00
Raccoon	16.50	33	Striped skunk	3.00	5.00
Coyote	35.00	33	Spotted skunk	6.00	5.00
Beaver	24.00	33			
Grey fox	40.00	33			

With deer the market is even more questionable. It is true that one can buy deer from commercial game breeders. However, there remains much skepticism that a deer raised in captivity can really replace a wild animal. There is also a supply problem; one or two deer can be purchased. A large supply would be virtually unobtainable. In order to accommodate this situation, a synthesized value for deer was prepared.

Investigation of the breeding characteristics of deer resulted in the author using the production cost for sheep as a proxy for deer. The production costs utilized to represent deer production are taken from the farm enterprises study in Tehama County for a 1,000 head sheep herd. Taking the cultural costs and overhead costs for the sheep production and relating them to deer, produced a value quite similar to the current market value of a mule deer.

The sheep study is based upon a 1,000 head herd. Deer production from 1,000 does would result in 1,850 fawns being born. Multiple births are quite common in deer; unfortunately, mortality at birth is also quite common. Out of the 1,850 births, 30 percent to 40 percent are not expected to survive. An additional 30 percent mortality is also expected at weaning (65 days after birth). Applying these statistics to the 1,850 births, one can expect a production rate of about 842 fawns from the 1,000 does ($1,850 \times 35\% \text{ birth mortality} \times 30\% \text{ weaning mortality}$). The commercial sheep production cost associated with a 1,000 head herd is \$100,855. From this figure, \$13,634 is subtracted as costs only to be associated with sheep (shearing, tagging, etc.). This gives a total cost of \$87,221; dividing by 842 fawns equals \$104 per fawn.

produced to weaning. This value adjusted for habitat availability, breeding cycle, and number of offspring produces a \$416 replacement for mule deer. Of the two deer species, blacktail and mule deer, game dealers list the replacement values at \$200 - 250 for the blacktail and \$300 - 400 for the mule deer.

The fourth category of mammal damage^{*} value relates to sensitive big game animals. The reproductive costs for rearing tule elk was utilized to represent this category. The unit value for tule elk comes directly from a previous damage assessment litigation in which a tule elk was destroyed by an individual and the courts held that individual liable. The replacement value derived at that time was \$6,000. The value established was taken from cost figures prepared by the Department of Parks and Recreation who maintain a tule elk reserve near Tupman. The Tupman reserve contains some 965 acres and produces 10 - 15 elk calves per year. The annualized cost associated with this production is \$71,827 divided by 12 calves equals the \$6,000 value. Adjusting this value to the CPI for 1978 yields a value of \$6,500 per elk.

A fifth and final category was considered to represent rare and endangered mammals. The author concluded that one must treat these mammals in a more individualized manner. Therefore, no category value was developed. When such an animal is affected, a specific evaluation and damage value assessment will need to be made for that point in time.

Replacement Cost of Fish

The California Department of Fish and Game has an excellent hatchery program for trout, warm water fish, and anadromous fish. A detailed production cost accounting is maintained and unit values per pound on per fish obtainable.

In estimating the replacement cost for fish lost in damage situation, the investigator needs simply to confer with the fisheries biologist as to the species lost, the numbers involved, and the appropriate production cost value to use.

The following tabulation is a summary of the 1977-78 production cost figures prepared for the Department of Fish and Game by Horton and Bruley (1979).

PRODUCTION COST OF HATCHERY REARED FISH
1977-78

	Nos/Raised (000)	Cost/Each
Resident species		
Fingerlings	9,035	\$.051
Subcatchables	1,018	.138
Catchables	12,297	.348
Broodfish	58	2.190
Subtotal	<u>22,400</u>	<u>\$.223</u>
Anadromous species		
Steelhead		
Fingerlings	178	.039
Yearlings	<u>1,298</u>	<u>.581</u>
Subtotal		
Salmon		
Fingerlings	,692	.121
Yearling	<u>332</u>	<u>.112</u>
Subtotal		
Warmwater		
Fingerlings	2,347	.019
Yearlings	<u>800</u>	<u>.433</u>
Subtotal		

Source: California Department of Fish and Game, Inland Fisheries Administrative Report No. 78-3, October 1978, Tables 14 and 15.

Fish and Wildlife Use Values

The second portion of this damage assessment evaluation is the recreational use value assignable to the species of fish and wildlife lost in natural habitat destruction.

Recreational value was deemed a pertinent entity in determining the damage value. Various species of fish and wildlife are utilized in consumptive sport activities (fishing and hunting). We know from past performance how many of each species are necessary for an adequate recreational experience. A dollar value for each sport activity can be assigned to each species.

The U.S. Fish and Wildlife Service has completed their national survey of hunting, fishing, and associated recreation based on the National Survey data, Brown (1978) established willingness to pay figures for various recreational activities. This data provides the most complete and current estimate of user willingness to pay values. The estimated values for hunting, fishing and general recreation are summarized in the following tabulation:

AVERAGE CONSUMER SURPLUS
(1978 Values)

Hunting		
Deer	\$46	per hunter day
Small mammals	20	" " "
Waterfowl	40	" " "
Upland birds	29	" " "
Fishing		
Warmwater fish	\$23	per fisherman day
Freshwater trout and salmon	25	" " "
Salt water fishing	88	" " "
General Recreation		
Big game	\$78	per recreation day
Small game	25	" " "
Migratory birds	47	" " "
Freshwater fish	22	" " "
Salt water fish	27	" " "

Source: Estimating Values of Wildlife: Analysis of 1975 Hunting and Fishing Survey. Gardner Brown, March 1978. PP 4 (Values corrected 1978 CPI)

Since damages imply the loss of recreational activity, compensation is called for. This means that willingness to sell rather than willingness to pay dictates the

damage value. Hammack and Brown (1974) and Meyer (1978) contend that this willingness to sell figure is 4 times that value of willingness to pay. Therefore, the above values should be multiplied by 4 when used in calculating recreational use values associated with recreational losses.

For those species which are nongame species as well as the game species, a certain amount of nonconsumptive sport activity is done (bird watching, etc.). An estimated 40 million bird-watching days were provided by the 400-plus species of birds in California. Approximately 37,500,000 recreation days are spent in nature walks by more than 3 million Californians. A recreational value per day was determined for birds and mammals using these total recreation days. Each species of bird and mammal was considered to provide an equal amount of nonconsumptive use activity in relation to the other species. Therefore, 40 million user-days associated with birds provide 100,000 user-days for each of the 400 species. Likewise, the 37,500,000 user-days of nature walks, used to represent nonconsumptive use of mammals, provide 170,500 recreation days for each of the 220 species of mammals. The effect of population (supply and demand) is extremely important. The fewer the numbers, the more valuable each becomes. In order to place population in its proper perspective, each species was categorized into one of five population categories. The limits of these categories were established from biological knowledge relating to the potential future of the various species with regard to population. Each category was considered increasingly important as the population diminished. By dividing the total user-days for each species by the midpoint of each population class, a recreational use figure can be determined for each animal. Assigning the appropriate consumer surplus value per user-day listed above produces a nonconsumptive monetary value estimate per animal. The following tabulation lists those values by population class and general species category.

NONCONSUMPTIVE USE VALUES

Population Class	Big Game	Small Game	Birds
Over 100,000	\$52	\$17	\$31
10,000 - 100,000	266	89	94
1,000 - 10,000	2,660	850	940
100 - 1,000	26,600	8,500	9,400
0 - 100	266,000	85,000	94,000

The nonconsumptive use value for fish are not related to population size and therefore cannot be devised in the same manner as the value for birds and mammals. Dr. Horvath (1974) in his study of the southeast concluded that the nonconsumptive use activities for fish has a people-participation rate of only about 20 percent of that for bird watching. He also found that their participation rate was only 31 percent that of bird watchers. By relating these factors to the use figures for birdlife in California (40 million x 20% x 31%), a nonconsumptive use figure for fish of 2.5 million days is calculated. This use at \$22/per user-day yields a total value of \$55,000,000. Relating this figure to the total population of California (21,198,000) produces a value per person of \$2.59. If we relate this figure to the number of people affected by the fish loss, modified by the percent of total fish loss, a total nonconsumptive fish value will be derived.

Existence Value

The third category we discussed was the existence value. How much value do people really put on things just knowing they exist? We know there is definitely a value, and that this value is magnified with the threat of extinction. Work done in fisheries recreation by Meyer (1975) suggests that where whole systems are at stake, requirements for compensation can exceed "willingness to pay" values by as much as 20 times. Conversely, where the product involved is relatively important, the two values tend to be close, Bohm (1971).

A study by Horvath (1974) on the American southeast estimated the compensatory requirements of hunting waterfowl at \$98 (adjusted for CPI to 1978) per day and at \$134 (adjusted for CPI to 1978) per day for nonconsumptive recreationists generally viewing wildlife. These figures are in the magnitude of 2.6 to 1 that of willingness to pay developed by Brown (1978).

Other studies, Romm (1969), Hammack & Brown (1974), Eby (1975), Banford (1977), Gordon & Knetsch (1977) reveal relationships in the 3 to 1 and 4 to 1 magnitude between required compensation and willingness to pay. Thus, by using the lower figures derived by Horvath, this study is certainly being conservative and cautious in estimating total sustained damages.

Using the nonconsumptive use values for compensation developed by Horvath (Birds \$119, animals \$157, fish \$132) and applying them to each category of wildlife in the same manner applied for nonconsumptive use values, the following existence value by population class is developed.

<u>Population Class</u>	<u>Animals</u>	<u>Birds</u>
(Unit value adjusted to 1978 CPI)	\$105	\$48
Over 100,000	535	238
10,000 to 100,000	5,350	2,380
1,000 to 10,000	53,500	23,800
100 to 1,000	535,000	238,000
0 to 100		

The existence value for fish, based on the same rationale of relating existence value of birds and mammals to the nonconsumptive use value for birds and mammals, is 6.0 times that of the nonconsumptive use value for fish. Horvath's compensation user-day value for fish is \$132 in 1978 dollars, while the nonconsumptive recreation user-day value reported by Brown is \$22. Therefore, a straight line relationship between the two values can be made and related to

the human population affected. The unit value derived for each individual affected, then, becomes \$15.42.

Damage to the Environment

A fourth area of damage is the damage to the environment; Gosselink, Odum, and Pope (1973) have examined the value of a tidal marsh in Florida and have computed values ranging from \$2,000 per acre to \$83,000 per acre. The lowest figure is related to the marshland's ability to produce fish to support commercial and recreational fishing. The highest value is based on what they refer to as a total life support. These two approaches plus each of the 3 intermediate value approaches contain segments of value which have already been accounted for in the fish and wildlife damage assessments. To utilize any one of these approaches would result in some double counting. However, the magnitude of the value of natural habitat is quite impressively depicted in their paper.

The bare minimum damage value for the loss of natural habitat to be used in this study will be the present worth cost of restoration necessary to bring the land back to its predamage condition. A study on marsh restoration prepared by Madrone Associates (1975) calculated the cost of restoration to be \$816 per acre. Adjusting this figure to the 1978 CPI establishes a minimum restoration value at \$990 per acre.

Habitat Use Loss

Another damage component which will result from habitat loss is the use of that habitat which existed before the damage transpired. Previous sections of this paper dealt with bird, mammal, and fish losses which would occur. Each of these components include a recreational use value. But there may be situations where other forms of use are lost. An example might well be hiking, swimming, picnicking, or boating. Should the alteration of the natural environment adversely affect any such current activity, that activity loss should be valued and included as a damage component.

Total Damage Estimate

The summation of the various component damage estimates bring together the various factors considered in the damage evalution. There are, possibly, many damages not included because of oversights or the inability to quantify them.

One particular point of concern should be in the time delay to correct the damages. Many restoration projects take time. There is usually a lag from initial loss to court judgment; then, an additional delay in remedial action; and finally a lag in nature from initial action to full mature restoration.

To fully account for these cummulative delays, a present worthing of annual values over the extended delay period is justified. The appropriate interest rate to use currently would be $8\frac{1}{2}\%$ to $9\frac{1}{2}\%$. This rate reflects the present and near future estimate of the price of money.

Presentation of damages for varying time delays can have a significant impact on the courts and those who review the report. Showing the accumulative effects of delaying restoration sometimes encourages quicker action. For, regardless of the monetary damage settlement received in the name of fish and wildlife, the most important element in natural resource management is the maintenance and rapid reatoration of critical habitat to insure the protection and preservation of our scarce natural resources.

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WASTE DISPOSAL PROBLEMS OF THE PETROLEUM INDUSTRY

MY NAME IS IVAN GILMAN. I AM GENERAL MANAGER OF ENVIRONMENTAL AFFAIRS FOR CHEVRON U.S.A., THE DOMESTIC OIL AND GAS COMPANY OF STANDARD OIL COMPANY OF CALIFORNIA. NEARLY TWO-THIRDS OF MY OVER THIRTY YEARS OF EXPERIENCE IN THE PETROLEUM INDUSTRY HAS BEEN SPENT IN VARIOUS ENGINEERING AND MANAGERIAL POSITIONS IN REFINING ACTIVITIES IN CALIFORNIA AND HAWAII. I HAVE ALSO HELD MANAGERIAL POSITIONS IN OUR RESEARCH AND EUROPEAN OPERATIONS. I HAVE BEEN IN CHARGE OF ENVIRONMENTAL ACTIVITIES FOR CHEVRON U.S.A. SINCE ITS CREATION IN 1977.

I WOULD LIKE TO REVIEW FOR YOU THE MOST SIGNIFICANT TYPES OF WASTES GENERATED BY THE OIL INDUSTRY. ALL SEGMENTS OF PETROLEUM OPERATIONS GENERATE SOME MATERIAL, EITHER SOLID OR LIQUID, WHICH MUST BE DISPOSED OF IN THE COURSE OF NORMAL OPERATIONS. WE HAVE HISTORICALLY HANDLED MOST OF THESE WASTES ON OUR OWN PROPERTY AND HAVE DISPOSED OF THE BALANCE OF THEM ACCORDING TO THEN CURRENT BEST PRACTICE. WE HAVE ALWAYS TRIED TO BE A VERY RESPONSIBLE COMPANY IN THE HANDLING OF ALL OF OUR BUSINESS INCLUDING WASTE DISPOSAL.

THE EXPLORATION FOR AND PRODUCTION OF CRUDE OIL GENERATES SEVERAL CHARACTERISTIC WASTE PRODUCTS. THE MAJORITY ARE NONTOXIC AND INCLUDE DRILLING MUDS (A COMBINATION OF NATURAL CLAYS, POLYMERS AND OTHER SPECIAL CHEMICALS SUSPENDED IN A LIQUID, USUALLY WATER), DRILL CUTTINGS (SIMPLY THE ROCK CHIPS FROM THE HOLE BEING DRILLED), PRODUCED WATER (WATER WHICH IS PRODUCED WITH THE CRUDE OIL AND RANGES IN SALINITY FROM FRESH TO ABOUT SEVEN TIMES SEAWATER), PRODUCED SOLIDS (FINE ROCK PARTICLES/SAND WHICH ARE PRODUCED WITH THE CRUDE OIL), AND THE OILY SUMP AND WATER TREATING RESIDUES (SMALL VOLUMES THAT REMAIN AFTER THE VARIOUS OIL AND WATER TREATMENT PROCESSES).

DRILLING MUDS ARE DISPOSED OF BY DIRECT DISCHARGE TO THE OCEAN, BURIAL ON SHORE, LAND SPREADING, OR DISPOSAL AT A CLASSIFIED DUMP SITE. DISPOSAL IN CALIFORNIA IS LIMITED TO CLASS I SITES DUE TO DRILLING MUD'S CLASSIFICATION AS HAZARDOUS. THIS CLASSIFICATION EXISTS DESPITE STUDIES BY THE CALIFORNIA DEPARTMENT OF FISH AND GAME, THE SOUTH COAST WATER RESOURCES RESEARCH PROJECT, AND THE GULF UNIVERSITIES RESEARCH CONSORTIUM WHICH SHOW NON-OIL-BASED MUDS HAVE LITTLE ENVIRONMENTAL IMPACT AND IN THE CASE OF CUTTINGS, MAY EVEN BE BENEFICIAL. SEVEN HUNDRED WELLS WILL DISCHARGE ABOUT 700,000 TONS/YEAR OF MUDS. COMPARE THIS TO DREDGING (38.5 MT/YR), TRAWLING (7.0 MT/YR) AND THE SANTA CLARA RIVER IN CALIFORNIA (22 MT/YR) ALL OF WHICH IS DISCHARGED IN ONE TO THREE DAYS.

PRODUCED WATERS ARE DISPOSED OF BY REINJECTION INTO THE FORMATION OR DISCHARGE TO A LOCAL WATER BODY. PRODUCED WATER AT CARPINTERIA, CALIFORNIA, IS CURRENTLY DISCHARGED TO THE PACIFIC OCEAN AFTER TREATMENT TO REMOVE SUSPENDED OIL. REPEATED STUDIES REQUIRED BY OUR DISCHARGE PERMITS HAVE SHOWN NO IMPACT ON THE AQUATIC ENVIRONMENT AT THE DISCHARGE POINT. STUDIES IN THE GULF OF MEXICO BY GURC SHOW THE SAME CONCLUSION. PRODUCED SOLIDS ARE USUALLY LAND SPREAD OR TRUCKED TO A CLASSED DISPOSAL SITE.

IT HAS BEEN SHOWN OVER THE LONG HISTORY OF THE OIL INDUSTRY THAT LITTLE NEGATIVE IMPACT RESULTS WHEN THESE WASTES ARE DISCHARGED AND WE BELIEVE THAT THOSE WASTES WHICH MEET REQUIRED LEVELS FOR TOXICITY, OIL CONTENT, ETC., PRESCRIBED BY REGULATIONS AND PERMITS, SHOULD BE ALLOWED TO CONTINUE TO BE DISCHARGED TO THE APPROPRIATE SURROUNDING ENVIRONMENT. THE AIR EMISSIONS ALONE ASSOCIATED WITH THE UNNECESSARY BARGING OR TRUCKING OF WASTES TO CLASSED DISPOSAL SITES MAY FAR

OUTWEIGH THE BENEFITS OF SUCH DISPOSAL.

AFTER THE CRUDE OIL HAS BEEN PRODUCED, IT IS USUALLY SHIPPED TO ONE OR MORE REFINERIES WHERE IT IS DISTILLED AND TREATED TO MAKE OUR CONVENTIONAL COMMERCIAL PRODUCTS. SOME OF THE BY-PRODUCT WASTES GENERATED IN THESE OPERATIONS ARE SIMILAR TO THOSE ENCOUNTERED IN OIL PRODUCTION. HOWEVER, BECAUSE THE PROCESSES INVOLVE HEAT, CATALYTIC ACTIVITY, TREATING AGENTS AND OTHER NON-PETROLEUM MATERIALS, MANY OF THE WASTES GENERATED ARE QUITE DIFFERENT FROM THOSE ENCOUNTERED IN OIL PRODUCTION. LIKE THE PRODUCING AREAS, THE REFINERIES ALSO MUST HANDLE THE SOLID RESIDUE WHICH IS DEPOSITED IN THE BOTTOM OF STORAGE TANKS IN THE COURSE OF THEIR USE. WE HAVE DEVELOPED MANY IMPROVED OPERATIONAL TECHNIQUES TO MINIMIZE THESE SOLIDS BUT THERE ARE ALWAYS SOME WHICH OCCUR AND MUST BE CLEANED OUT ON A FREQUENCY WHICH VARIES FROM ABOUT FIVE TO TWENTY YEARS. THESE MATERIALS ARE GENERALLY OIL-LADEN SOLIDS SUCH AS SAND, OIL-WATER EMULSIONS WHICH CANNOT BE BROKEN, AND OTHER SOLID MATERIALS OCCURRING IN THE PROCESS. WE DISPOSE OF MOST OF THESE MATERIALS BY LAND FARMING THEM ON OUR OWN PROPERTY. EPA HAS RECENTLY APPROVED LAND FARMING AS AN ACCEPTABLE DISPOSAL TECHNIQUE FOR THESE OILY WASTES.

SEVERAL TYPES OF CATALYSTS ARE USED IN REFINERY PROCESSING. ONE OF THE LARGEST VOLUME MATERIALS HANDLED IS CATALYTIC CRACKING CATALYST WHICH IS BASICALLY AN ALUMINUM SILICATE, SIMILAR IN CHEMICAL COMPOSITION TO BEACH SAND BUT WITH MUCH SMALLER PARTICLE SIZE. SPENT CATALYST OF THIS TYPE WHICH REQUIRES DISPOSAL USUALLY ENDS UP AS LANDFILL. BECAUSE THE MATERIAL IS EXTREMELY FINE, HAVING THE CONSISTENCY OF FLOUR, IT HAS TO BE APPLIED TO THE LAND WITH A WATER

STREAM TO KEEP IT FROM BLOWING AWAY. THERE ARE SOME METALS DEPOSITED ON THE CATALYST DURING ITS USE BUT RESEARCH PERFORMED BY OURSELVES AND OTHERS INDICATES THAT THESE METALS DO NOT LEACH INTO UNDERGROUND AQUIFERS.

THE SMALL AMOUNTS OF WASTE FROM OUR LEADED GASOLINE PRODUCTION ARE, OF COURSE, EXTREMELY HAZARDOUS. THE PETROLEUM INDUSTRY HAS HAD VERY RIGID PROCEDURES FOR HANDLING THESE MATERIALS SINCE THEY WERE FIRST INTRODUCED FIFTY YEARS AGO. MOST OF OUR REFINERIES HAVE A DEDICATED AREA ONSITE WHERE ANY LEAD CONTAMINATED MATERIAL IS COLLECTED, NEUTRALIZED AND BURIED IN A WAY WHICH CANNOT CONTAMINATE EITHER SURFACE OR GROUND WATERS. THE EARLY RECOGNITION AND MITIGATION OF THE POTENTIAL HAZARDS OF LEADED WASTES IS TYPICAL OF THE APPROACH WE HAVE TRIED TO USE WHENEVER A HAZARD IS DETECTED.

THERE ARE MANY TREATING CATALYSTS WHICH ARE USED IN THE PRODUCTION OF REFINED PETROLEUM PRODUCTS. SOME OF THEM ARE CLAYS, OTHERS ARE SOLIDS IMPREGNATED WITH VARIOUS CHEMICALS, AND SOME ARE VERY COMPLEX ZEOLITIC MATERIALS WHICH HAVE ACTIVE METALS DEPOSITED ON THEM. EACH OF THESE CATALYSTS, WHEN SPENT, IS HANDLED ACCORDING TO FAIRLY STRINGENT RULES TO MINIMIZE THE EXPOSURE TO BOTH OUR WORK FORCE AND THE PUBLIC AND TO ELIMINATE THE CREATION OF A POTENTIAL HAZARD. MOST OF THE SPENT CATALYSTS CONTAINING METALS ARE REGENERATED OR REPROCESSED TO RECOVER THE METALS. THE CATALYST BASE WHICH REMAINS AFTER METAL RECOVERY IS A NON-HAZARDOUS ALUMINA WHICH IS USED AS LAND FILL. THE OTHER BY-PRODUCTS OF OUR RECLAMATION AND REUSE ACTIVITIES ARE HANDLED IN A SIMILAR FASHION. WE OCCASIONALLY HAVE WASTE OILS WHICH ARE RETURNED TO US WHICH WE NORMALLY HAVE TO REPROCESS THROUGH THE REFINERY.

WASTE PRODUCTS ARE ALSO GENERATED BY THE SHIPPING ACTIVITIES WHICH EITHER RECEIVE THE CRUDE OIL TO BE PROCESSED OR DELIVER OUR FINISHED PRODUCTS TO MARKET. IN THE CASE OF MARINE SHIPMENTS, THE PRIMARY WASTE IS OIL-CONTAMINATED BALLAST WATER DISCHARGED FROM THE SHIPS WHEN THEY LOAD. THE NEWER VESSELS HAVE SEGREGATED CLEAN WATER BALLAST AND DO NOT HAVE TO CONTEND WITH THIS CONTAMINATED WATER PROBLEM. MOST OF OUR MARINE TERMINALS, HOWEVER, HAVE FACILITIES TO RECEIVE, TREAT AND DISCHARGE BALLAST WATER SO THAT NO OIL GOES INTO THE MARINE ENVIRONMENT. THERE ARE ALSO WASTES ASSOCIATED WITH RAIL RECEIPTS AND SHIPMENTS. MATERIALS RECEIVED BY FREIGHT CAR OFTEN HAVE DUNNAGE WHICH MUST BE DISPOSED OF USUALLY EITHER AS SCRAP LUMBER OR IN A GARBAGE CATEGORY. CERTAIN TANK CARS HAVE TO BE CLEANED PRIOR TO REUSE. THE WASTE OILS AND MATERIALS FROM THESE CLEANINGS ARE PROCESSED FOR OIL RECOVERY, THE WATER DISCHARGED THROUGH OUR REFINERY EFFLUENT SYSTEM AND THE OIL PUT BACK INTO REFINERY PROCESSING. VERY FEW WASTES ARE ASSOCIATED WITH TRUCK SHIPMENTS UNLESS A SHIPMENT BECOMES CONTAMINATED. IN THIS UNLIKELY CASE, THE ENTIRE SHIPMENT IS USUALLY RETURNED TO A REFINING CENTER FOR REPROCESSING.

THERE IS A CONTINUING PROBLEM WITH REUSE OF SHIPPING CONTAINERS. STEEL BARRELS ARE THE MOST NOTABLE EXAMPLE. RETURNED BARRELS, WHICH CAN FREQUENTLY CONTAIN ALL SORTS OF LIQUID AND SOLID DEBRIS, ARE CLEANED, DE-DENTED AND REPAINTED BEFORE REUSE AT A REFINERY OR LOADING FACILITY. THE MATERIAL REMOVED FROM THESE BARRELS, AS WELL AS THE OLD PAINT, HAS TO BE PROCESSED THROUGH THE REFINERY WASTE WATER TREATMENT SYSTEM TO ASSURE ITS SAFE DISPOSAL. WE ALSO HAVE A LIMITED NUMBER OF USED CANS AND PLASTIC CONTAINERS RETURNED TO OUR MARKETING OR REFINING CENTERS. IN GENERAL, LITTLE RECLAMATION OF THESE CONTAINERS IS POSSIBLE. MOST OF THEM ARE CLEANED AND DISPOSED OF AS LANDFILL.

THIS HAS BEEN A VERY GENERAL DESCRIPTION OF THE TYPES OF PROBLEMS WHICH WE ENCOUNTER IN THE PETROLEUM BUSINESS AS FAR AS THE GENERATION AND DISPOSITION OF SOLID WASTES IS CONCERNED. IT INDICATES THE COMPLEXITY OF OUR OPERATIONS AND THE MANY AREAS IN WHICH THE QUESTION OF WASTE GENERATION AND DISPOSAL HAS TO BE DEALT WITH.

I WOULD NOW LIKE TO PRESENT CHEVRON'S VIEWS ON THE "ULTRAFUND" ISSUE. THE PROPOSAL, AS DESCRIBED IN S-1341, WHICH EPA HAS GENERATED COMBINES SEVERAL VERY DISPARATE ISSUES UNDER WHAT WE BELIEVE TO BE A CUMBERSOME UMBRELLA. IT IS DIFFICULT TO FIND THE COMMON THREAD OF PURPOSE OR TECHNOLOGY OR EXPOSURE BETWEEN THE HANDLING OF OIL SPILLS, THE HANDLING OF SPILLS OF HAZARDOUS SUBSTANCES, THE CREATION, OPERATION AND INSPECTION OF DUMP SITES AND THE CLEANUP OF PREVIOUSLY ABANDONED DUMP SITES OF ALL SORTS. CHEVRON BELIEVES THAT OIL SPILLS AND HAZARDOUS SUBSTANCE SPILLS SHOULD EACH HAVE A SEPARATE CLEANUP FUND WHICH IS PROVIDED BY THOSE BUSINESSES AND INDUSTRIES WHICH GENERATE THE PROBLEM INCLUDING GOVERNMENT AGENCIES. THE FUNDING OF THE CREATION, LICENSING AND INSPECTION OF NEW CLASS I DUMP SITES COULD ALSO BE FUNDED BY THOSE USING THE FACILITIES AS LONG AS ALL USERS WERE INCLUDED. TO TRY TO HANDLE THE CLEANUP OF ABANDONED DUMP SITES IN THIS MANNER SEEMS HIGHLY IMPROPER. CHARGING THESE COSTS TO ANY INDUSTRY OR SET OF INDUSTRIES REPRESENTS, IN FACT A TAX UPON THESE BUSINESSES. THE PUBLIC PRESUMABLY BENEFITED FROM THE LOWER COST OF PRODUCTS WHICH RESULTED FROM THE USE OF THESE ABANDONED SITES BY THE DUMPERS IN THE PAST. IF IT IS DETERMINED THAT CLEANUP IS IN THE PUBLIC INTEREST, IT IS MUCH MORE LOGICAL TO FUND SUCH CLEANUP FROM GENERAL TAX REVENUES RATHER THAN A TAX IMPOSED UPON INDUSTRIES WHICH MAY HAVE HAD NO MORE ASSOCIATION WITH THE CREATION OF THE PROBLEM THAN THE MOST REMOTE SECTOR OF THE GENERAL PUBLIC. WE BELIEVE THAT THE

COMBINED HANDLING OF THESE ACTIVITIES UNDER A SINGLE FUND IS NEITHER PROPER NOR EFFICIENT AND, HENCE, WE ARE NOT IN FAVOR OF THE AGENCY PROPOSAL.

IN CONCLUSION, I WOULD LIKE TO ADDRESS THE PROBLEM OF PROVIDING ADEQUATE CLASS I DUMP SITES FOR THE TRULY HARD-TO-HANDLE AND TOXIC MATERIALS. IT HAS BEEN ESTIMATED THAT AT LEAST 400 NEW CLASS I DUMP SITES MUST BE ADDED ACROSS THE UNITED STATES IN THE NEXT 5 TO 8 YEARS IF THE WASTE SITUATION IS TO BE SATISFACTORILY HANDLED. THIS NEED WILL BE GREATLY AGGRAVATED IF THE DEFINITION OF THE TYPE OF WASTE WHICH HAS TO BE DISPOSED OF IN A CLASS I SITE IS ENLARGED TO INCLUDE THE HIGH VOLUME, LOW HAZARD WASTES SUCH AS UTILITY SCRUBBER SLUDGES, SPENT CRACKING CATALYSTS, DRILLING MUDS, SPENT OIL SHALE AND OTHER SIMILAR MATERIALS. SUCH AN INCLUSION WOULD PROBABLY INCREASE THE NEED FOR DUMP SITES BY TEN FOLD AND CREATE A TREMENDOUS PROBLEM IN DISPOSING OF THE TRULY HAZARDOUS MATERIALS. CURRENT PUBLICITY IN THE WAKE OF THE LOVE CANAL SITUATION HAS MADE IT ALMOST IMPOSSIBLE TO SITE A NEW CLASS I DUMP ANYWHERE IN THE UNITED STATES. WE DO NOT BELIEVE THAT THE PRESENT APPROACH TO THE PROBLEM WHICH EPA AND MOST STATES ARE USING WILL PROVIDE A SATISFACTORY MEANS FOR HANDLING THE SITUATION. WE STRONGLY RECOMMEND THAT CONGRESS SHOULD REQUIRE EPA TO CAREFULLY REVIEW AND LIMIT THE TYPES OF WASTES WHICH MUST BE HANDLED IN CLASS I SITES AND ENCOURAGE THE STATES TO DO LIKEWISE. FAILURE TO SOLVE THESE PROBLEMS WILL INUNDATE EXISTING AND EVEN POTENTIAL CLASS I SITES BEYOND THEIR CAPACITY VERY QUICKLY AND WILL CREATE AN INTOLERABLE PROBLEM IN THE HANDLING OF THE TRULY HAZARDOUS WASTES WHICH ARE GENERATED. WITH OR WITHOUT THIS ACTION, BOTH GOVERNMENT AND BUSINESS MUST WORK TOGETHER TO EFFECTIVELY

EXPAND THE NUMBER OF CLASS I SITES AVAILABLE IF THE TRULY HAZARDOUS WASTES ARE TO BE PROPERLY HANDLED.

THANK YOU FOR THE OPPORTUNITY TO MAKE THIS STATEMENT. IF YOU HAVE ANY QUESTIONS, I WILL TRY TO ANSWER THEM.

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